ELECTRICAL REVIEW

[ILLUSTRATED.]

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Electrical Flying Machine.

A recent despatch from Berlin states that the success of the aeronaut L'Hoste and his companion in making in a balloon the journey across the Channel from Cherbourg to London has caused no little excitement there. It is the first successful attempt to reach a point determined on beforehand, and indicates a decided advance in aeronautics, which will be put to good use in a coming war. Germany and Russia have both for some time been pushing forward experiments in the flying machine for use in war or otherwise. The direction in which they have been working was the one which, previous to the experiment just made by L'Hoste in the balloon Torpilleur, was most likely to be successful. It ignored the idea of the inflated gas-bag, which is enormous in size, difficult and costly to fill in war, and floats—a gigantic derelict—at the mercy of every current of air, a huge mark for the first gunner who can hit and bring it to the ground.

Baumgarten in Germany and Baranovski in Russia have adopted the principle of the inclined plane pressed against the air, and thus capable of making some attempt, at least, to regulate its own course. In the kite the force that presses the inclined plane is the hand of the boy acting through the string. In the sail of the boat the resistance of the water to side-long motion keeps the sail pressed against the wind. In the flying machines of Baumgarten and Baranovski the pressure is given by an engine carried by the machine and acting by means of fans. The difficulty was the weight of the engine and the fuel; but with the development of practical knowledge of electricity accumulators have been built which supply the maximum of motive power with the minimum of weight. If the attempts should prove successful, the problem of flying in still air would, it is thought, be solved. But whether men shall ever be able to ride the storm is another matter.

The Tesla Electric Light Company.

This company has been organized nearly two years, and has devoted that time to perfecting a complete arc-light system, which we take pleasure in presenting to the readers of the REVIEW in this issue. The headquarters of the company are in Rahway, N. J., and a branch office in New York. The president of the company is Mr. B. A. Vail, of Rahway; vice-president and treasurer, Robert Lane, of East Orange; secretary, H. C. Carmen; electrician, N. Tesla. The particular improvements that are claimed for this system relate to the efficiency, the regulation and the safety. There are a number of novel features, particularly in the construction of the machine and its regulation.

In the illustration, Fig. 1, is given a side view of the Tesla dynamo. The magnetic frame of the machine is so constructed as to concentrate the greatest amount of developed magnetism upon the armature. To this end the cores of the field magnets are made tapering, and the magnetic frame is the smallest in section at the middle. The magnetism is in this way, the inventor states, concentrated upon the middle; the central line is sharply defined, and a better working of the armature is obtained. The main improvements claimed are, however, embodied in the construction and winding of the armature, which is supported upon a separately cast-base piece, fastened to the lower core by means of fusible dia-magnetic material. The object of the construction is to reduce to the minimum the development of Foucault's currents in the armature core; and also to reduce to a minimum the resistance of the inactive wire on the sides of the armature, and to balance both parts of the armature. The shape of the amature is so calculated that these objects are obtained.

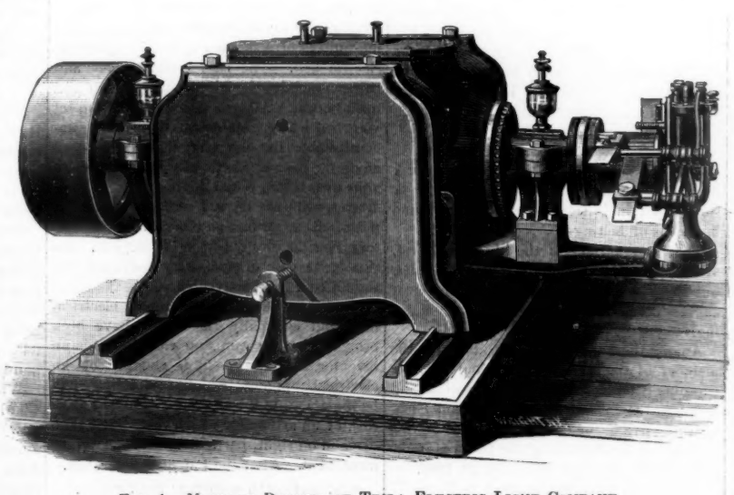


FIG. 1.—VIEW OF DYNAMO OF TESLA ELECTRIC LIGHT COMPANY.

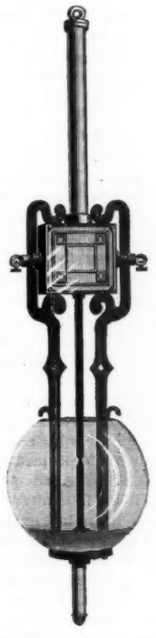


FIG. 2.—VIEW OF TESLA ARC LAMP.

Mr. Tesla, the inventor, has obtained broad patents on the regulation of a dynamo machine on entirely novel principles. This method of regulation secures advantages in the way of economy and safety that he is confident are peculiar to this system alone. No auxiliary resistances, or opposing coils, are used, and the regulation is effected without waste of power.

In Fig. 2 is shown a view of the Tesla arc lamp. The main objects desired to be secured by the inventor, were first of all, simple and reliable apparatus; preventing the vibrations of the movable carbon in consequence of the fluctuations of the current; then to obtain a perfect feed and a steady light. The lamp cuts itself out and in without the aid of any auxiliary apparatus. The action of the magnets of the lamp is so delicate that the feeding is imperceptible. The design of the lamp frame is neat, and the lamp is substantial and reliable.

This system is now in daily use on the streets of Rahway, N. J., where all visitors are privileged to see it at work. The company is now constructing a number of large machines, and is ready to go before the general public with an arc light system that will, no doubt, meet with great favor.

Perspicacity and Prudence Combined.

"What's the matter, Jones? You look disgruntled." "No wonder; Battersby just now called me liar." "And you didn't knock him down?" "No, he was at the other end of the telephone."

— The electric headlight of the Akron, Ohio, Company, is said to have met with much favor recently among railroad men, and several of the leading roads are thinking of adopting it.

CHICAGO.

The Garden City Electrically and Scientifically Considered.

[Interesting and Valuable Review by our Staff Correspondent.]

THE BRUSH CO.

Mr. Alex. Kempt, special agent of the Brush Company, at 130 Washington street, has just returned from Cleveland, where he has been on a flying business trip. Mr. Kempt says he never saw the Brush shops so busy at this season of the year, even where there was no opposition system to offer competition. Every piece of machinery, whether for arc or incandescent work, was as busy as possible—no idle machine anywhere. The company is doing more than any summer before.

Locally, the business of the Brush folks at this agency is good and growing. Recent plants have been installed (arc-lights except otherwise stated) as follows:

Kirby Carpenter Co., Mills at Menominee, Mich.	60
H. Whitbeck & Co., Mills at Marinette, Wis.	50
City of Escanaba, Mich.	65
Ashland City Lighting Co., Ashland, Wis.	65
(this is a duplicate of previous order.)	
Waupaca City, Wis.	20
" " " Incandescent, additional	300
Black River Falls, Wis.	30
Franz Falk Brewing Co, Soldiers' Home, Milwaukee	30
Eau Claire, Wis, additional	65
La Crosse, " "	65
Aberdeen, Dak., new.	30
Grand Forks, Dak., new	30

The above is but a partial list of plants Several contracts for plants only await signatures, but Mr. Kempt declines to publish these until the act is complete for evident reasons.

THE FORT WAYNE JENNEY CO.

The Fort Wayne Jenny Company, whose Western agent, W. J. Buckley, is located in the Montauk Block, reports business brisk and satisfactory, considering that this is everywhere, except upon the lake and sea shore, the heated term. At New Orleans this company has a large street plant, and its system is exemplified away up on the northern extremity of the country. Its dynamo sings at Orange, New Jersey; its lights blaze in portions of California; and at Paris Ill., the company is preparing to light the town Hannibal, Mo.; Davenport, Iowa; Seattle, W. T.; Cheltenham Beach, near Chicago; Litchfield, Ill; the Occidental, San Francisco, and many other plants are all of recent origin.

One specialty with the Fort Wayne Jenney people is the tower, and another is the mast arm, with which to do city and street lighting. While the question of the high suspension of lamps is a mooted one, people will try the experiment, and the Fort Wayne Jenney Company is prepared to meet the demands of high notioned citizens.

THE M'INTOSH CO.

The McIntosh Galvanic and Faradaic Battery Company, which a year or so ago

changed its quarters, and located at 300 and 302 Dearborn street, is composed of Chas. S. Emmert, president; C. F. Berg, secretary, and others, among whom is Dr. McIntosh, from whom the company gets its name.

The specialties of the company are both frictional machines and current generators, and in addition to these, considerable attention has been given by the Doctor to accumulative batteries and dynamos. Mr. Chas. Wirt, formerly with the Western Edison Light Company here, is with the McIntosh Company.

STATIC APPARATUS.

Another, who is pursuing the science of electricity from the static standpoint is Mr. P. Atkinson, who has manufactured some of the largest plate machines in America. Mr. Atkinson's room is No. 19, 169 Randolph street. A close student, a facile inventor, and a concise writer, this gentleman will furnish a machine, or an opinion, on atmospheric electricity on call. Some of his improvements in static apparatus are quite important.

ELECTRIC LIGHT ENGINES.

There are even more varieties of engines than of electric light systems in vogue here, and there is competition without end among these. To attempt to give the plants which the various companies have in use here and elsewhere, which have emanated from Chicago houses would require one to hire a hall or buy a printing office.

N. Y. SAFETY STEAM POWER CO.

Among others, selecting indiscriminately, may be mentioned the New York Safety Steam Power Company's engines and boilers. The company's manager here, Mr. W. A. Hammett, by his energy and being able to fully endorse the engines he is selling, has sown these broadcast, not only in the city, but elsewhere throughout the country. In nearly every Southern State, where electric lighting is common, the New York Safety Steam Power Company's engines are found, and Hammett is largely to blame for it.

Only a few days ago Mr. Hammett sold a 25 horse-power engine to go to Sea Breeze, N. Y., where it will run a Fort Wayne Jenney plant, sold here.

The following are among the engines furnished from the Chicago house during Mr. Hammett's management for electric lighting purposes:

Home Electric Company, two, a 50 and 75 horse-power; Mission Ridge Panorama, one 50 horse-power; Gettysburg Panorama, one 25 horse-power; Cavalry Armory, one 25 horse-power; Houston's Pavilion, one 25 horse-power; Illinois Clothing Company, one 25 horse-power; Levi & Michaels, one 25 horse-power; Reetor's Oyster House, one 15 horse-power; Memory Building, one 15 horse-power; Wilde's Clothing House, one 25 horse-power; Clifton House, one 25 horse-power; Tobey Furniture Company, one 25 horse-power; Standard Theatre, one 15 horse-power; Cheltenham Beach, two of 80 horse-power each, and for a panorama at Kansas City two of 60 and 50 horse-power respectively.

The above lighting plants are not of any one system, but include nearly all the various kinds in use hereabouts.

THE WESTINGHOUSE.

The Westinghouse automatic engine, too, has proven a favorite among electric light people. The Chicago agents are Fairbanks, Morse & Co., who are also to be found in the city directories of Cincinnati, Cleveland, Louisville, and St. Paul.

The claims for this engine are that it is simple in construction, easily operated, first cost equally as low if not less than any other first-class engine, being light, the freight and foundation cost are less than others of less compactness; that there is no cost for erection, and that the wearing parts are easily replaced and cheap.

On the 1st of December last there were 1,370 engines running, varying in capacity from 2 to 200, and aggregating 43,333 horse-power, in every class of work that stationary engines may do.

Looking over the list of these different industries one finds 15 engines of 60 to 65 horse-power running for the Brush Electric Light Company, at Buffalo, N. Y. Seven engines with a total of 330 horse power in the New York and Brooklyn Electric Light Company's rooms. The Cleveland Electric Light Company uses five with a total of 310 horse-power; the McTighe Electric Light Company uses six; the McKeesport, Pa , Company has four, total 500 horse power; Portland, Oregon, three sixty-fives; the T.-H. Company, at Quincy, Ill., three sixty's; the E. E. L. Company, Chicago, has two of 4 and 25 horse-power respectively.

They are found in Butte and Helena, Montana; Lynn, Mass.; Lincoln, Hastings and Omaha, Neb.; Springfield, O.; Louisville, Ky.; Duluth and Detroit, and away down at Las Vegas, N. M.

THE OGDEN.

The Ogden Engine Company, of Chicago, is a home institution which is of recent birth. But few of their engines have been placed on the market, and although the engine may be said to have passed its experimental or milk-tooth stage, and it has given good satisfaction where used, the inventor will undoubtedly modify some portions of his machine in the near future, and render it still more perfect than before. The Ogden engines are running two electric light plants—one at the central station of Wunder and Abbott on Fifth avenue, where two 40 horse-power engines are each run up to 65 horse-power, and also at the stock yards, where two 75 horse-power engines are running a central plant.

THE BALL.

P. S. and George Kingsland form the firm of Kingsland Brothers & Co., 28 South Canal street, and are the Western agents for another favorite electric light engine—the Ball.

From memory the following plants are named where these engines are doing good work in that line of business.

120 H.P.	Taylor Building,	Chicago,	W. Elec.
180 "	Legrand Rink,	"	T. H.
60 "	Jas. Armstrong,	"	Schuyler
60 "	Bee Hive,	"	W. Elec.
40 "	W. Ind. Depot	"	W. Elec.
40 "	Cent. Resta rant,	"	Sperry
60 "	Globe Hotel,	"	"
60 "	Columbia Rink,	"	W. Elec.
60 "	Freeport,	Illinois,	T. H.
120 "	Galesburg,	"	Sperry
120 "	Chillicothe,	Montana,	"
120 "	Marysville,	"	"
60 "	Carthage	"	"
100 "	Ottawa,	Kansas,	"
220 "	Clinton,	Iowa,	T. H.

The last named plant went in on the 1st of August and the town nearly went wild at the city airs which would hereafter be possible to them. One of the fairest belles of the city, with the grandest lineage, turned the switch which set the town in a blaze, both of light and excitement. The plant is not yet complete, but the "starter" was enough to astonish the entire community.

THE IDE.

The Ide engine has also become quite a favorite with a class of plants where a slower motion is transferred to the dynamo by means of belting up.

The headquarters of the Ide at the West, are at Springfield, where the inventor resides, but there are in this city quite a number of engines doing good service in electric lighting.

Among these the following come up to the memory of the writer: The Golden Eagle Clothing Store; Davis & Morse, Notions and Varieties Establishment; Buckingham Theater; and five in the county buildings of this county. A description of the Ide was published in the REVIEW, February 20, 1886.

THE WILLIAMS.

The Williams Engine Company, whose office is at 702, 3, 4 Insurance Exchange, Chicago, is another claimant for a share of electric light patronage. The officers of the company report business brisk and satisfactory.

They recently furnished an 80 horse-power engine, with boiler and all to match for a plant in Lake, south of the city, and have just sent a similar outfit to Newark, Ohio.

THE WESTERN ELECTRIC CO.

The Western Electric Company's position and standing, its products, methods and extent are all too well known to electrical people to need anything more than a passing notice here. The company here reports business in all branches brisk and promising. In addition to the contract for a complete multiple system for the Central Exchange at Cincinnati, the company has secured contracts for Patterson cable for Cincinnati, Detroit and other places. The demand for the electric lighting apparatus of this company is growing. There are now in use about 1,200 of its system of lamps, and contracts are on hand for several hundred more.

The new Chicago magneto bell is giving universal satisfaction. In addition to this style of bell the W. E. Company manufacture the improved Gilliland and the Williams bell, well known to all telephone people.

The company pays special attention to the trade in telegraph and telephone wires, and the large stock, both of iron and copper which is kept on hand, enables them to fill orders for this class of goods promptly.

The W. E. Company has greatly increased its facilities for turning out insulated wire of all kinds. Some of its principal products in this line are fine magnet wire, electric light line wire, underwriter's insulation, for either incandescent or arc lines. Patterson cable for anything electrical, with conductors, small as the finest telephone copper, or large as is required for the underground circuit in a huge arc plant. Their lead tape cable—a comparatively new article—used for connecting up multiple boards is also a specialty with the W. E. Company.

As large as their factory is, the Western Electric people are crowded with work.

THE AMERICAN ELECTRIC MANUFACTURING COMPANY.

The American Electric Manufacturing Company, owing to a large increase of business has been obliged to seek more commodious quarters, and has removed from its former cramped and uncomfortable locality to 117 and 119 Lake, corner of Clark street. The company has for its manager and secretary, Mr. D. S. Foote, an old telegrapher, well known to the fraternity throughout the West. In addition to carrying on hand a large line of all kinds of electrical goods and supplies of the kinds known as staples, the company is prepared to do all sorts of electrical work, such as electrical gas lighting, burglar alarm work, call bells, annunciators, every conceivable form of battery or magneto work attachments and supplies.

A novelty for temporary use in case of sickness, or, what is very nearly the same thing, a week's residence among the sand-hoppers and mosquitoes of a summer resort, is a portable electric bell. The case contains bell and battery, and attached is a duplex cord and push button. All you have to do is to set your bell where you desire to make it uncomfortable for the servant, trail the cord along the floor or on hooks upon the wall to your own bed. When the hour for torment arrives, roll over in bed and reach for the push-button, push it and laugh. Your victory over the sleepy person is complete. Seriously, in case of temporary necessity this should be a great convenience.

Mr. Foote, like all dealers in the electrical line, and especially those who have been brought up, as it were, on electricity, is an inventor, and at present is engaged on an electrical applianee, which, in due time, will be illustrated in the REVIEW. Further than this, of an article for which there must be a demand on sight, particulars may not yet be mentioned. After the Patent Office—then.

THE NATIONAL ELECTRIC SERVICE CO.

Among the electrical enterprises of the West, the National Electric Service Co., at 195 Wabash avenue, must not be omitted.

The rule which obtains so generally and places old telegraphers at the head of electrical work, regardless of the particular branch, finds another verification in this instance. George H. Bliss, the manager of the National Electric Service Company, is one of the olden-time operators, at one time connected with what is now the Western Electric Co., then superintendent of the Western Edison Co., whence he was called to manage the affairs of this company.

The specialty of this company is an electrical attachment for the regulation and control of heating apparatus, either steam, water or air. A full description of this invention of Prof. W. S. Johnson, was illustrated in the REVIEW of May 2, 1885.

Business in this line is reported brisk, although at this season of the year it is only in demand for future use. Every one in Chicago, however, knows the necessity of preparation in the matter of heat and ventilation, and the great advantage of this apparatus for its purposes cannot be underrated.

To fully describe it in a few words, it may be said to be a perfect regulator. Whatever degree of heat is required is maintained as perfectly as if a human hand had the matter in charge; even better than that, for with this combination there is neither meal time nor quitting time, and it cares nothing for the differences between labor and capital.

ELECTRICAL ENGINEERING.

On the North Side, Mr. Foree Bain, inventor of the system of arc lighting which bears his name, having dissolved his connection with electric lighting, has opened a general electrical and mechanical establishment at No. 95 Indiana street. Mr. B. announces himself as an electrical and mechanical engineer, and offers his services to perfect unfinished inventions, contract for wiring of all and every kind, in and out of doors, diagnose and treat all sorts of diseases in electrical apparatus and machinery.

THE BROWN ELECTRIC CO.

In the same general district, at Nos. 1, 3 and 5 Michigan street, the modest sign of the Brown Electric Co., and Harold P. Brown, electrical engineer, are seen. The head of the concern, Mr. H. P. Brown, is a graduate from the Western Electric Co., and also of Brush Company here. It was for a long time a favorite idea of Mr. Brown's to arrange some species of apparatus for the purpose of utilizing an arc light current—or a portion of it rather—for incandescent purposes.

The result of some years of study and experimenting has developed the "Brown converter," an instrument which has hardly age enough as yet to warrant an opinion on its economical use, based on experience. Mr. Brown is indefatigable, and his commendable perseverance will certainly develop all there is in it. Like insulation, time is the only test for such combinations, and Mr. Brown's host of friends wish him every success in the direction he is so thoroughly and industriously probing. Experimentally, it works all right, and those who know Mr. B. personally believe he has the germ of a grand future in his converter.

THE ELECTRICAL SUPPLY CO.

The Electrical Supply Company, at 171 Randolph street, of which Mr. F. S. Terry is manager, on being interviewed as to trade, reports demands good, sales ditto, and prospects for the fall business very encouraging.

There are several specialties which this Company pays particular attention to, in addition to the class of electrical work usually found in such an establishment. By this last remark is meant insulated wires, call bells of a dozen different forms, batteries, telegraph tools, induction coils, push buttons, annunciators, and all that sort of thing.

Wirt's voltmeter, the invention of Mr. Charles Wirt, recently with the Edison, but now with the McIntosh Company; a new ammeter of their own designing; a new form of electric light switch-board which originates with them; Sperry's ingenious little lightning arrester for electric light lines, a sort of an electrical snap dragon, are among the specialties of the stock. The supply company is also agent for Day's kerite wire—one of the standard wires which electric lighting men swear by.

The company is also sole agents for the Haskin's hanger, a sample of which has been put up, as in actual service, in their salesroom. They report sales of this new form of hanger as very encouraging, and say that the hanger is giving most perfect satisfac-

tion. It is Mr. Terry's purpose now to advocate the Haskin's hanger as a competitor for street lamp service on poles. A recent suggestion by the inventor has made this perfectly feasible.

A committee from Milwaukee, consisting of Mayor Walber, Chief Engineer Poley, the Fire Committee from the Board of Aldermen, the City Fire Commissioner, George Glassner, Superintendent of Fire Alarm; A. G. Rose, Secretary of the Milwaukee Board of Fire Underwriters, and Mr. John Bannon, of the *Sentinel*, invaded the Electrical Supply Company's establishment in a body, on the 4th instant, and personally inspected the hanger, to which they accorded their most unqualified approval, as a safe, cheap and perfect method of suspending lamps.

UNION ELECTRIC COMPANY.

The Union Electric Company, at 196 Jackson street, is a comparatively new enterprise, with hardly more than small office room in its present quarters, but which has a large field in the future in a direction quite novel and peculiar. In the fullness of time the company will develop a road through the electrical forest which is to-day unbroken. Col. Henry Fitzhugh is president of this organization, and J. S. Zimmerman, secretary, and the company, in addition to the darkly-shadowed project above, will manufacture electric lamps and dynamos, and motors for street and elevated railways. The systems are those of the Operman variety.

Chicago, Ill, August 9.

The Professor on the Transmission of Heat by Electricity.

I was sitting in the reading room of the Lathe and Planer Association the other evening at a loss for something to do, when in strolled my old friends, Jones and Smith. They had scarcely seated themselves when Prof. Pharadeigh, the teacher of science in the village school, came in to look at the last number of the *Arbeiter für Handwörkeringesthehenheit*.

Jones—"Professor, my little girl came home to-day from school and began to ask me about some dynamos and heating by wires. I thought her story was a pretty good one."

Smith—"My boy told me I'd better get out of the stove business, as they were going to burn the coal right in the mines, and in some way get the heat to go anywhere you wanted it."

The Professor laid down the copy of the journal with a long name, adjusted his spectacles, and began: "Smith, what do you do to that dynamo in the foundry to have the lamps light up?"

"Why, turn the inside of the dynamo around by the engine."

"Yes, but what makes the engine go?"

"The steam."

"And where does steam come from?"

"The heat makes the water in the boiler into steam."

"Now, let's see if we understand it so far The heat from the coal fire makes steam, which makes the engine move, and that sets a part of the dynamo turning round; and from the dynamo comes off a current of electricity."

"But where do you get the heat to use?" broke in Jones, the moulder.

"You remember," said the professor," the day the piece of small iron wire was placed so that the current went through it?"

"Yes," replied Jones; "it got hot very quick, but I don't see why."

"Iron is not the best conductor, that is, does not carry the current of electricity easily; and since in this case the wire was small and in working so hard to get through this small wire, the wire got hot. The wise men can't explain exactly, but such is the fact, as you saw."

"Isn't it the same in the incandescent lamps?" asked Smith.

"Yes,' replied the professor, "only in those the little charred wood wire becomes white hot, and so lights up."

"So you are going to heat a house by incandescent lamps? it will take a pile of them for that," remarked Smith.

"Nearly that," said the professor. "Instead of the charred wood wire (or carbon filament) as it is called, wires made of German silver will be used, never heated to redness; for in that case they would melt."

"That all may be," remarked Jones, "but I calculate that the whole 100 lamps in our shop don't give as much heat in a whole day as a shovelful of coal in my wife's range. and I know that many a shovel full goes into the furnace during the day."

"That's it," exclaimed the professor, as he slapped his knee, "not more than one-tenth of the heat from the coal is really used in moving the engine with the steam, the rest goes up the smoke stack, or out at the exhaust, and is lost. The dynamo gives nearly as much current as it can, a little is lost in heating the wires which run from the dynamo to the lamps. The longer the wires running from the dynamo the more the heat is lost in them; so that if you tried to have your electric cook stove fifty miles from the coal mine, of the one-tenth of the heat changed by the engine and dynamo into electricity only a small portion would be received in your stove."

"Would the wire to carry the current from the mine cost much?"

"For any distance over a few miles, very much."

Smith shook his head and said, "I should think it would be a mighty sight cheaper to take the coal right to the stove in the first place and use it there."

"That's so," exclaimed the professor. "I can't make my scholars see it in that way; in fact too many of them don't know how to make a fire."

"I wish," said Jones, "you would tell me something about these new-fangled race-horse engines."

"Can't to-night. Time for me to saw my stick of wood for exercise and go to bed. Perhaps I'll be round to-morrow night."

The party broke up and Jones went home happy in the thought that stoves would not go out of fashion. F. M. G.

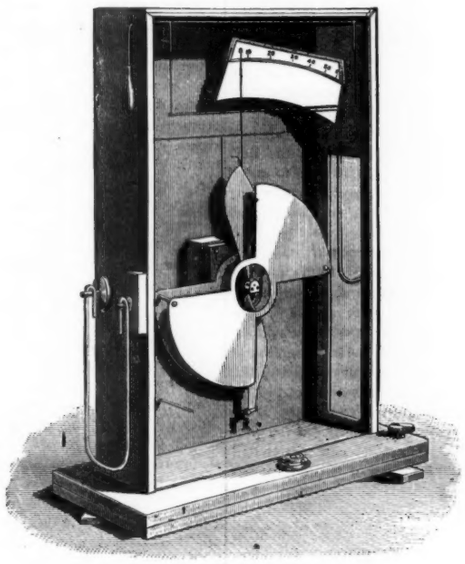
Boston, Mass., Aug. 9, 1885.

* * The extreme delicacy of the sense of smell in man has been shown by a series of experiments by Messrs. Fischer and Penzoldt. In an empty room of 230 cubic meters capacity, and tightly closed, a small quantity of the substance to be detected was thoroughly mixed with the air, and the observer then admitted. Among the different substances it was found that the smallest amount recognizable was .01 of a milligram of mercaptan. This quantity diffused through the room sufficed to make its distinctive character appreciable in the small volume of air coming in contact with the nerves of the nose, from which it was estimated that the 1.460,000,000 part of a milligram of this substance was recognizable. Hitherto the spectroscope has been considered the most delicate of all means of analysis, indicating less than the millionth part of a milligram of sodium, but the sense of smell, in the case of mercaptan, at least is seen to be at least 200 times more delicate.

The Electrostatic Voltmeter of Sir William Thomson.

This instrument consists of an air condenser with one of its plates capable of a to-and-fro motion so as to vary the capacity of the condenser. It is handled in this country by James W. Queen & Co., of Philadelphia. The fixed brass plates are supported so as to be actuately parallel to each other and in metallic connection, while they are thoroughly insulated from the case of the instrument. The movable plate is of aluminum, and is supported in a vertical position on a knife edge; the plane of its motion being parallel to the fixed plates and situated midway between them. The upper end of this movable plate has a fine prolongation which serves as a pointer for indicating the deflections on the scale of the instrument, and at its lower end is fixed a knife edge having its length perpendicular to the plane in which the plate moves.

There are two pairs of terminals, one pair for the fixed plates and the other pair for the movable plate, and each terminal is insulated from the case of the instrument. Of the pair on the left-hand side of the case, the terminal towards the back of the instrument is in metallic connection with the fixed brass plates, while that towards the front (which may be called the working terminal) is simply an insulated brass pin. A glass U-tube is suspended between these two terminals, and contains a safety arc connecting them, consisting of two short wires at the ends of the U-tube and an intervening length of thread, kept moist by a little water in the bend of the U-tube. The terminal toward the back of the instrument on the right-hand side is in metallic connection, through the V-groove support, with the movable plate; in other respects the pair of terminals on the right is similar to the pair on the left.



VOLTMETER OF SIR WILLIAM THOMSON.

In order to save time in taking readings an arrangement is provided for checking the oscillations of the movable plate, and stops are placed to limit its range and prevent damage to the pointer.

When the fixed and movable plates are connected respectively to two points of an electric circuit, between which there exists a difference of potential, the movable plate tends to move so as to augment the electrostatic capacity of the instruments, and the magnitude of the force concerned in any case is proportional to the square of the difference of potential by which it is produced. In the use of the instrument this force of attraction is balanced by the horizontal component of a weight of any convenient amount hung on the knife edge at the bottom of the movable plate.

The scale is graduated from 0 to 60, and the divisions represent equal differences of potential—the actual magnitude of the difference per division being dependent upon the weight in use at the time. A set of three weights is sent with each instrument, of respectively 32.5, 97.5, and 390 milligrammes, providing for three grades of measurement in the proportion of 1 : 2 : 4. Thus the instrument shows one division per 50 volts with the link (the lightest weight) alone on; one division per 100 volts with the medium weight hanging on the link, and one division per 200 volts with all three weights on.

To set up the electrostatic voltmeter in working order:

1. Having removed the glass door of the case, place the movable plate or vane on its knife edge support, handling it very carefully lest it be bent or twisted in the operation. A line drawn lengthwise on the surface of the movable plate and passing through its intersection with the knife edge divides the portions above and below the knife edge into unequal parts. When the movable plate is properly placed this line is just seen behind the vertical edge of the fixed plate when the pointer indicates zero, and the smaller segments of the movable plate are then hidden from a front view by being between the fixed plates.

2. To detect, and if necessary correct, any accidental bending of the pointer, with reference to the attracted portion of the movable plate, hang one of the weights on the lower knife edge; take the round pin sent inside the case and with it press the movable plate in between the fixed plates until it rests in the two V-notches near the upper end of the vertical edges of the fixed plates; holding the pin so, rotate it about its axis, and observe that the pointer indicates a small thin line seen on the scale *C* division-numbers 30 and 40.

3. Remove the weight and see whether the movable plate is in neutral equilibrium, and if necessary adjust it to fulfil this condition by means of the wires for that purpose fixed to the upper end of the plate.

4. Be careful always to use the working terminals with safety-arc for connecting to the two points whose difference of potential is to be measured, especially if the difference in question be very great, or if a large Leyden battery, or a dynamo, be in connection; as otherwise damage might be done to the instrument.

The Originator of Atlantic Telegraphy.

An article in "Representative Canadians; a Cyclopedia of Canadian Biography," goes to establish pretty conclusively that to Mr. F. N. Gisborne, and to him alone, is due the credit of first suggesting, and in fact, of originating trans-Atlantic submarine telegraphy. The Hon. Joseph Howe, in a letter to Mr. Gisborne, dated Feb. 12, 1867, when he was Secretary of State for Canada, says: "Without desiring in the slightest degree to undervalue the services rendered to civilization by the body of eminent men who have just been rewarded for laying the Atlantic cable, I own to some feeling of disappointment in not seeing any mention made of your name, as I have reason to believe you were the first pioneer of the enterprise, as well as the original promoter of electric telegraphy in the Maritime Provinces. * * * In 1850 you discussed with me, and subsequently laid before the commissioners, a plan for connecting Newfoundland with the Continent of America, and obtained leave of absence to enable you to go to that island and secure support to the project. * * * On your return, you asked leave to go to New York to promote an extension of the line to England, and spoke confidently of being able to extend it across the Atlantic and connect Europe with America. * * * As the original pioneer and projector of this great work, it appears to me that you ought to place yourself in your true position, and if not included among those who are to be honored and rewarded, you should at least endeavor to obtain from your countrymen, and from the world at large, who are to be benefited, the recognition which you deserve as the originator and practical prime mover of the great enterprise now so happily brought, by a combination of public-spirited and able men, to a fortunate consummation." Mr. Gisborne, during a visit to New York, spoken of in the letter, for the first time met Cyrus W. Field, and is said to have then succeeded in interesting him in the scheme with which the great capitalist afterward became so closely identified.

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The City of the Straits will have the honor of entertaining the bone and sinew of electric lighting a few days hence. She may not entertain "angels of light," but one and all are advocates of light.

Mr. John R. Whitley, of the "American Exhibition," London, England, was a recent caller at the REVIEW office. Mr. Whitley has been a zealous advocate of this enterprise for two years past, and is now confident of an unprecedented success. The exhibition opens on May 24, 1887, and continues until October 31. The occasion will, we think, justify the electrical interests of this country in making conspicuous displays, and we trust that no other American industry will be permitted to lead in this regard. The president of the exhibition is Hon. E. B. Washburne, Chicago, and the president of the general council, A. T. Goshorn, of Cincinnati, both widely known and strong men, and the board of directors includes such names as Geo. M. Pullman, Dr. Norvin Green, N. K. Fairbanks, John W. Mackey, John B. Carson, and a number of other prominent and representative American gentlemen.

Stockholders in telephone companies are happier these dividend days.

The improved transmitter is the keystone to long-distance telephoning—and E. T. Gilliland evolved it.

Anybody with a telephone (one that don't infringe Bell is preferred) will receive a warm welcome in Evansville, Ind.

The Russell House, Detroit, Mich., will be the headquarters of the next meeting of the National Electric Light Association, which convenes August 31st, two weeks from next Tuesday.

The Old Timers (telegraphic) meet in Cleveland the latter part of this month. The REVIEW expresses the hope that their ranks will be found intact, and that each member will feel as young as he did when the meeting was held in this city one year ago—and that was a pretty fair degree of youthfulness, the Timers will all acknowledge.

Philadelphia is talked of as the place of the February meeting of the National Electric Light Association, and this very naturally brings the name of Mr. A. J. De Camp, of that city, the active and earnest chairman of the Executive Committee, into prominence as the next president of the Association, should a change in that office occur.

What is the matter out West? For over a week we have seen no mention of the organization of a new telephone company owning instruments which do not infringe the Bell patents, and which defies the Bell Company. If they don't endeavor to make it entertaining for that energetic gentleman, President Geo. L. Phillips, of the Central Union, he won't enjoy life.

The programme of the St. Louis meeting of the National Telephone Exchange Association appears on another page. These meetings are of great value to the telephone fraternity, and are the occasions of presentations of the experience and discoveries of the brightest and ablest members in relation to the many questions that constantly arise. The St. Louis meeting promises to be particularly fruitful, and much new matter will be discussed and solutions of several important problems presented.

We nominate the Hon. Chas. Selden, of Baltimore, for any position that President Cleveland desires filled by a gentleman possessed of electrical ability of the highest order. We don't suppose he would accept, but it would be a neat recognition of his tact and management, which made a memorable Deer Park honeymoon so uninterruptedly pleasant, and yet kept satisfied an enterprising corps of newspaper correspondents by furnishing rare telegraphic service on that unapproachable mountain top.

The writers on the morning and evening papers of New York and the members of the Press Club have been tendered an excursion by boat and rail by Mr. Joseph Pulitzer, proprietor of the *World*. The event will probably occur August 24th, under the management of the trustees of the Press Club. One thousand dollars is the amount Mr. Pulitzer has placed in Editor Cockerill's hands to be expended on this occasion. There is a substantial generosity in this act that the New York writers will assuredly appreciate.

Many of our readers have enjoyed the very interesting Western news that appear regularly in this journal. Additional facilities have been furnished our Western branch recently, and Western readers will be more promptly served hereafter, and the volume of interesting matter from that great and progressive territory will be increased. Our versatile and enterprising Chicago representative, Mr. C. C. Haskins, presents elsewhere in this issue an interesting pen picture of the growth and extent of electrical industries in his city. Mr. Haskins is not only an able and experienced writer, but is a reliable and thoroughly well informed electrician.

THE CONVENTION AT DETROIT.

To Chicago parties desiring to attend the Electric Light Convention, the Baltimore and Ohio Railroad Company will make a special rate, and also furnish a special car for their accommodation. Any further information may be obtained by letter, or personal application, to Geo. S Bowen, 196 Jackson street, Chicago

TRYING TO GET GENERAL TELEPHONIC SERVICE IN FRANCE.

The French press is, naturally enough, indignant at the Government for the tardiness with which it acts upon measures looking to placing the telephone in general use. The *Journal des Debats*, in a spirited article, calls upon the French Chambers to stop talking and to do something. It tells the Government that America, England, Germany and Belgium are far ahead of France in the exploitation of the telephone, and ridicules the timid attempts that have been made to establish telephonic lines between Rouen and Havre, and between Paris and Rheims. It thinks that if, under monarchies, the convenience of the whole people is furthered, surely under a republic, like France, the use of such a necessary article as the telephone should not be restricted to a few large cities. The *Societe Generale des Telephones* is, it seems, desirous of obtaining from the Government a concession of certain telephonic rights, which, if granted, will result in giving the French people generally the use of the telephone. The society seeks to obtain what we would call in America a monopoly of telephone rights, for a term of thirty-five years, without guarantee of interest, and engages to supply a telephonic service to both urban and suburban residents at a fixed rate—400 francs ($80) a year in Paris and 300 francs ($60) in the departments. Its capital will be 25,000,000 francs, with the privilege of increasing it to 75,000,000.

M. Cochery, the Minister of Posts and Telegraphs, has found a worthy auxiliary in M. Jules Roche, and the two are working hard to get the Chamber of Deputies to bestir themselves in this matter of general telephonic service in France. But the wheels of republican government move slowly in France, as they do on this side of the water, and if, as alleged, jobbery rides less rampant under a republic than under a monarchy, it rides quite as effectively withal.

THEY WILL ALL BE THERE.

There is now no doubt of the success of the Detroit meeting of the National Electric Light Association. The attendance will be much larger than at any previous meeting, and, as we have before stated in these columns, the programme will be the most interesting and valuable of any that the Executive Committee have been able to present. The editorial in the REVIEW last week, which urged all members to be present, has brought numerous responses from all parts of the country, in which assurances are given that the writers will attend. Eastern members are now fully awake to the advantages to be gained by being present, and will go in bodies from the leading cities. Everything now indicates one of the most important gatherings at Detroit, August 31st, ever held in this country in behalf of any practical science. The effect on the uses of electricity in general, and electric lighting in particular, cannot fail to be most beneficial, and will give new zest to the earnest workers in this field.

The inhabitants of the city of Ravensburg, in Würtemberg, have protested against the telephone lately introduced there, on the ground of its attracting lightning, and so proving a source of danger to the city. These wise men should object to the erection of houses on the same theory. Or to lovely ladies on the street—for are they not attractive?

BALTIMORE ELECTRICAL NEWS.

From a staff correspondent of the REVIEW.

Probably nowhere in the United States is the street lighting more satisfactory than in Baltimore. 450 Brush arc lights, 2,000 candle-power, are used for this purpose, and including store lights 676 are furnished from the Brush Electric Light Company's station, which has an electrical capacity for 1,000 arc lights, power for 1,100 and boiler capacity for 1,500. Although fuel is very cheap in Baltimore, especially the lower grades, the company has the competition of low prices, it may be said, low quality gas. For a long time gas was sold for $1 per 1,000 cubic feet, and by competition has lately been still farther reduced to 50 cts. The quality is, however, much below the standard of other cities. The candle power varies from 10 to 20 standard candles, often being nearer the lower figure. The contrast between the dingy smoky appearance of buildings lighted by gas with the bright walls ceilings, and furnishings of those illuminated by the arc or incandescent lights, is certainly much against the reputation of the smoky illuminant. The heat in the summer is so intense that a room lighted by gas is almost suffocating. The station of which we are speaking has kept to the front in extending the field of its business in new directions. Arc lights, incandescent lamps in multiple series, stories for incandescent lamps, and motors are all in some cases run on the same circuit and with perfect success. There are 310 sixteen candle-power incandescent lamps in multiple series on Brush multiple series distributors. In this hot city much satisfaction is expressed at the great relief from heat in using them in place of gas. Amongst the numerous buildings visited which are lighted in this manner perhaps the Mercantile Trust and Deposit Company is as fine an example of what can be done in the line of adapting the incandescent light to the highest class of buildings. The wiring is entirely concealed from view although the structure is built throughout of stone and iron. No gas is used, 42 sixteen candle-power incandescent lamps being distributed through the offices and vaults.

There are 200 motors on arc light circuits in various parts of the city, the larger number being of small size for fans, sewing machines and other small powers. It may be confidently affirmed never before have small amounts of power been distributed over large areas so successfully.

Staus Bros., manufacturing clothiers, have been experimenting with two of these one-tenth horse-power motors in running sewing machines at work on heavy cloth, as many as four thicknesses being sewed at one time. The work can be accomplished three times as rapidly as by hand. This establishment will soon have their entire factory equipped with thirty motors, which were designed by Mr. Baxter, of the Morrison Electrical Works. They are series wound, and of the Siemens type, wound with one layer of wire, with twelve or more commutator sections, thus reducing the sparking till it is imperceptible. This is all the more remarkable as the current is taken from a 2,700 volt circuit, in which there are included arc lights, incandescent lights in multiple series and storage batteries.

One of the finest buildings in Baltimore is that of the Crescent Democratic Club. The president is Hon. J. F. Morrison, and the membership includes all the prominent Democratic citizens. In a well-lighted room in the cellar there are three rows of three horse-power storage batteries, twenty cells in a row. The cells are of the improved Faure pattern, manufactured by the Viaduct Manufacturing Company. Each cell rests on porcelain insulators, and the whole base supporting the cells is separated from the floor by glass insulators. The conducting wires in this room are carefully covered. The batteries have been in use for five months, and the lead connectors of the positive plates give hardly the slightest signs of oxidization, thus showing that no acid fumes arise from the liquid during charging. The 300 incandescent 38-volt Swan lamps are run from one, two or all three rows of cells, according to

the number of lamps burning. A complete test is often made, and a record kept of the performance of the plant. On one occasion it was found at the end of a week that 5,681 amperes had been supplied to the batteries, and 7,578 amperes had been used in the lamps, leaving 1,897 amperes, which evidently came from a previous charging. The Joul Gutman building is completely wired, and a 300-light storage battery plant will be installed in a few days.

The steam plant of the Brush station consists of five 150 horse-power Buckeye automatic cut-off engines and one 60 horse-power Ball; the latter is used on day as well as night circuits. The boilers are ten in number, seven of which are furnished with the Jarvis patent furnace, which will soon be put in the other three boilers. The president of the company is J. F. Morrison, and the general superintendent, D. E. Evans.

The Morrison Electrical Works occupy a building adjoining the Brush station. Four large floors are filled with machine tools of the finest manufacture. The company make various kinds of electrical instruments and machinery of the finest description. They have built motors of the Stockwell pattern and the Edgerton 1, $\frac{1}{2}$, $\frac{1}{12}$, $\frac{1}{24}$ horse-power. The one horse-power Edgerton is used often in connection with a 36-inch exhaust fan for ventilating purposes.

Attention has been given lately to the production of a new form of motor, called from the name of the designer, the Baxter. By bringing the iron of the armature near to the field, and employing only a small amount of wire in a large number of sections, all sparking is avoided at the commutator. The speed is varied by moving the brushes toward the neutral point. A one-tenth horse-power motor has given 71 per cent. commercial efficiency, which is no discredit to the largest sizes of the most famous forms. The bearings have a solid lubricant, requiring attention once in a few months. The machine is noiseless, and throws no oil under the highest speeds. Three of Elliott Bros.' experts are now connected with the works, and the most intricate forms of electrical apparatus are made. A mirror tangent galvanometer is nearly finished for the Physical Laboratory of the Johns Hopkins University. The coil is four feet six inches in diameter. A switchboard is placed on the base with two rows of twenty-eight holes, for connecting up any part of the 28 coils, which are all of the same resistance, and so placed that the effect on the needle is the same for all the coils.

The Daft surface railroad in Baltimore has now been running more than a year, and has certainly been tested long enough to develop any faults in the systems. Its operation gives entire satisfaction, and so far from being a mere toy which would be abandoned as soon as the novelty wore off, the number of passengers carried steadily increases. Using the four cars with motors attached, and moving on different portions of the 2½ miles of track, over 2,000 persons have been carried in a single day. Taking into account the heavy grades and the sharp curves, the road appears at least unfitted to be operated by horses. These were formerly used. The road was easily adapted to the electric system as the rails were T-shaped. A third rail carefully insulated was laid between the two first. The roadbed is extremely uneven, and the successful operation of the road, at a far less expense than with horses, gives us a hint as to the success of a like road built expressly for an electric system. The wild stories told of animals killed by stepping on the rails amount, perhaps, to as much as one that a representative of the REVIEW investigated. It seems that a very mulish mule received a shock, fell down, and resolved thereupon to turn over a new leaf, and was so much improved in disposition that his owner was much pleased with the change. It is said that that company were obliged to partially cover the third rail to prevent blockade of the track by mules brought by their owners to the rails for treatment. The number of goats browsing by the road side would indicate that the current is not very dangerous. F. M. G.

Baltimore, Md., Aug. 2.

HOW TO ESTIMATE FUEL COST.

(FROM A PRACTICAL MAN.)

The cost of steam power, in any way the figures are made up, is one of most serious import; in fact, it is one of the largest factors in the cost of electric light, whether used in a private installation or in an electric light company's plant.

Makers of plant seem to have adopted systems, as well as nomenclature, of terms, constants, values, units, etc., but they would seem to differ most materially in their estimates of cost of steam power, as well as in the expression of how they figure out the cost; some curious expressions of this were made at the last electric light convention in Baltimore, and from this one can gather that while the cost remains one of the largest items, the comparison of the cost of steam-power, is an unknown as well as an unrecognized quantity. Why should this be so?

Engine builders have units of reference and comparison; electric light plant men have certain standards which are to all interested very plain and intelligible, but when electric light plant operators come to "compare the cost" of steam power, then facts become as scarce as the traditional "white crow." We hear of pounds of coal per horse-power. At Scranton, Pa., they buy 2,240 pounds (or more if they can pile it on the cart) of "waste" for 30 to 50 cents, in Baltimore from $2.10 down to $1.60, or an average of $1.80 to $1.90 per ton for mixed fuels, while in some parts of Massachusetts coal costs $5.75, at the boiler furnace mouth, per ton.

Where then any sense in saying that the horse-power costs three pounds per hour; for what does three pounds mean? simply that in one place they buy plus seventy pounds for a cent, and in another locality only 3½ or about that; another one uses four pounds per lamp per run; one man runs all the lamps he can swing for 3½ to 5½ hours, while another runs "all" 5½ and drops off half and runs the rest of his circuit until daybreak." What does the cost "in hours" or "per lamp" amount to?

One plant may be fitted up with condensing engines and the most approved boilers, while another (and we have seen them) are run by wheezy old traps that ought to have been run through the cupola years ago; and so on through all the changes from a first-class steam plant down to the merest and worst "parody" to be found.

In horse-powers we have everything, as all "electrical men" know, from the L. E. Phant down to the backyard goat, all classed as "horses" with the same abandon that sellers of "lights" claim for light life, efficiency, etc., in some cases, so that without really reflecting upon any one or any class, or upon some of the ancient machinery (?) in use, the question could easily be raised, "What shall or can be the unit that will suit all circumstances?"

Some years ago an Eastern engineer made the point that the unit should be stated in the cost per horse-power per hour, and there seems to be no good reason why such a unit cannot be adopted so as to be comparable and understood in all sections of the country, and with perfect fairness to maker, buyer and user of the steam boiler, engine, or electric plant.

The cost of fuel, boiler evaporation, engine economy, and the amount of brains that enter into the handling of a plant are all factors in the cost of the "H. P;" but there is another item necessary to be plainly stated, that the "horse" power to be given as cost is none of the nondescript genius alluded to above, but an indicated horse-power, in which honest indicators, a fair count and correct returns all enter into, and that our horse shall be 33,000 pounds lifted one foot high every minute, and guesses are not to be taken, nor the supposed mean exerted pressure from which the power that the engine must be doing is all so well calculated.

These facts seem to be necessary to be plainly understood, for too much guesswork has been and is indulged in in the steam-power question; but the digression is as necessary as the main question.

It might be a matter for the next session of the Electric Light Association to discuss, in case they deem it of some importance, whether the adoption of some such unit would not promote comparisons, and reference value to such comparisons.

The New England cotton mills have succeeded in closely counting the cost of steam power, and have made the horse-power for 308 days, of 11 hours each, including steam up all night and Sundays for "fire," for $27, or 3,388 hours of actual work, not counting "fire precaution," which gives the cost of a horse-power as $\frac{7969}{10000}$ cents per hour—say 8 mills—and this includes engineer, assistants, coal, oil, and moving ashes and keeping cleanly If the cost of fuel alone is to be considered, then the horse power costs from $\frac{29}{100}$ cents per hour all the way up to $1\frac{55}{100}$ cents per hour, which makes a very great difference in cost as well as another annual or semi-annual calculation—the dividend.

Much more could be said—some thinking is, perhaps, in order.

DIE TECHNIK DES FERNSPRECH-WESENS.

BY DR. V. WIETLESBACH. With 123 Illustrations. Published by A. Hartleben.

PREFACE.

"The following pages offer a survey of the present state of the art of telephony. Only such apparatus and contrivances are described as, in the knowledge of the author, have come into general use. No consideration is given to the historical development of the science, and the numerous additional applications of the telephone, as, for instance, to the measurement of electro-dynamic currents, to physiological experiments, etc., are not mentioned.

"I hope, in thus limiting the scope of the work, that I have been able, in the prescribed limits of this volume, to assemble the more important subjects bearing on the science of telephony."

The octavo volume of 266 pages warrants us in congratulating the author on having abundantly accomplished the object which he states briefly and clearly in the preface given above.

The author is prominently connected with the telephone service in Switzerland, and his book has the additional interest to the telephone people of this country which results from the illustration and description of telephone apparatus and methods of work in that country, which is probably the most progressive on the continent, telephonically considered.

Not that the apparatus and methods peculiar to Switzerland alone are considered. The Gilliland switchboard, the Western Electric standard and multiple boards, and the Law multiple are among the familiar American instruments shown and described. Some statistics also, comparing European and American telephone business, show that the author is fully alive to what is going on on this side of the Atlantic.

The conciseness and clearness of explanations and descriptions are noteworthy and commendable. The illustrations are numerous and carefully prepared.

A translation of the work will be made undoubtedly, and we are confident that the telephone fraternity in this country will give the book, in its English dress, a warm welcome.

A great falling off in the market value of the twenty different kinds of telephones which were brought out at the time of the first flurry in Indiana has taken place. Only a few months ago there were at least—for twenty read forty—telephone companies who flaunted their systems in the faces of all interested in the Hello! business either as purchasers of stock or as practical users of instruments. One after another of these has been shelved by the courts until the number of kinds has very much decreased, and there is far less confidence manifest on the part of the promotors of telephones who only a short time ago were ready to go on trial with the American Bell, and give it a black eye. The race is running out. As the poet had it some where a while ago:

"Since Drawbaugh failed to draw the bow,
By stacking packs and mark-ed deck tricks.
No other now has any show.
Lamar has killed the pan electrics."

Wrinkles — Electrical and Otherwise Practical Information.

ECONOMICAL PAINT.

Skim Milk.....2 quarts.
Fresh slaked Lime....8 oz.
Linseed Oil.....6 oz.
White Burgundy Pitch 2 oz.
Spanish White.....3 lbs.

The lime is to be slaked in water, exposed to the air, and mixed in one-fourth the milk. Dissolve the pitch in the oil, and add a little at a time. Then add the rest of the milk and the Spanish White.

A German chemical journal commends the use of paraffine as the best method of making porous corks gas and water-tight. Allow the corks to remain for about five minutes beneath the surface of melted paraffine in a suitable vessel, the corks being held down either by a perforated lid, wire screen or similar device. Corks thus prepared can be easily cut and bored, have a perfectly smooth exterior, may be introduced and removed from the neck of a flask with ease, and make an absolutely perfect seal.

A simple way of cutting glass is to crack it over a needle like flame of gas. Start the crack with a file, and then apply the flame, which may be produced through a minute perforation, in a glass connected with some rubber piping, so as to allow of the flame being conveniently carried from point to point. The crack will run before the flame in any desired direction.

To make modeling clay knead dry clay with glycerine instead of water, and a mass is obtained which continues moist and plastic for a length of time. This removes one of the greatest inconveniences that is experienced by the modeler.

Everyone must have noticed the destructive combination of lead and iron from railings being fixed in stone with the former metal. The reason of this is that the oxygen of the atmosphere keeps up a galvanic action between the two metals. This waste may be prevented by substituting zinc for lead, in which case the galvanic influence would be inverted. The whole of its action would fall on the zinc, the one remaining uninjured, the other nearly so. Paint formed of the oxide of zinc, for the same reason, preserves iron exposed to the atmosphere infinitely better than the ordinary paint composed of the oxide of lead.

For mending glass objects of value, which would be disfigured by common cement, chrome cement may be used. This is a mixture of five parts gelatine to one of a solution of acid chromate of lime. The broken edges are covered with this, pressed together, and exposed to sun light, the effect of the latter being to render the compound insoluble even in boiling water.

Moderately thick plates of sheet brass may be cut chemically by drawing a line or mark with a solution of mercury in nitric acid. The acid attacks the copper while mercury amalgamates with the zinc; this seems to be the explanation; at any rate, the brass becomes as brittle as glass on the place where the line is drawn, and is easily broken off.

Zinc plates expand and contract strongly under the influence of change in the temperature, and become quite brittle in the cold. Zinc, therefore, must be allowed plenty of play room. It should be attached either with nails of zinc or of strongly galvanized iron, as iron nails will rapidly rust out.

The following process is used by bookbinders for lettering in gold on leather or cloth: The place where the lettering is to appear is coated twice with albumen, and then covered with gold leaf. The title, locked up in a fillet, is then heated and pressed into the leather. Any superfluous gold leaf can be readily wiped away by using a soft rag.

Telephonic News

*** Lightning struck a telephone pole in Bingham, Mass., tearing the pole into kindling wood.

*** Chief Walker, of the City Electrical Department of Philadelphia, estimates that $178,114 will be required to run his department during 1887. The police patrol service has just been completed in this city, thirty-two patrol boxes being in position.

*** A statement of the earnings and expenses of the Missouri and Kansas Telephone for the past six months is given below:

For the Three Months Ending March 31, 1886.

Gross earnings	$48,562 09
Gross expenses	26,088 15
Net earnings	$22,473 94
Dividend No. 5	9,986 00
Balance to surplus account	$12,487 94
Cost of construction for the quarter	$8,474 49
Subscribers added during the quarter. 284	

For the Three Months Ending June 30, 1886.

Gross earnings	$52,061 04
Gross expenses	27,974 85
Net earnings	$24,086 21
Dividend No. 6	10,000 00
Balance to surplus account	$14,086 21
Cost of construction for the quarter	$20,499 65
Subscribers added during the quarter..146	
Number of miles toll lines built.	75

*** The citizens of Evansville, Ind., are now clamoring for the telephone. It will be remembered that the City Council had all the poles and wires taken down, and now they would give a good deal to have them up again. The *Tribune*, of that city, which has taken a sensible view of the telephone trouble, contains the following: "The suffering public are still anxiously awaiting the substitute which was readily promised in a new telephone to replace the utility of the one destroyed by the Council. The people were assured that there were a dozen or more telephones which could be brought here within twenty-four hours. While we never reposed any confidence in these promises, there were many citizens who did, but these are now losing faith and beginning to realize the utter inability of the Council and its allies to fulfill their promises. * * * * The situation is growing strained. Our citizens are demanding some proof of the sincerity of the promises made, and if nothing can be done by the Council they may make an effort to do something for themselves. Such is the temper of the public, who have been deprived of the telephone, and theirs is a common sense view of the subject."

*** The other evening when a storm was at its height and lightning was playing tag across the black sky, three young men of a neighboring city climbed up into the loft of a telephone office. The switchboards and enunciators were being manipulated by nimble boys. Blue sparks were jumping from point to point on the big switchboards, and scores of drops were constantly rattling down upon the brass rods of the annunciator frames. The boys were very busy pushing up the local drops, and they paid little attention to the out-of-town indicators which are arranged on the front of cabinets supported by sewing-machine tables. These drops were all down, and the visitors replaced them and stood waiting to see them fall again. Nassau street (New York) went down at the first flash, and before the sky was again illuminated Elizabeth, Newark, and Paterson went rattling down. Spring street and John street fell simultaneously during the next ten seconds, and Orange came tumbling after. When the drops were replaced one of the young men remarked that the Elizabeth drop was doing more falling than any other drop. Each of the others thought that a particular drop on his table would be the first to go down, and they began to back their opinion with dimes. The coins were laid on the cabinets over the favorite drops, and the backers waited patiently for a flash of lightning to hit their particularly wires and enrich them. Betting was lively for a half hour, and it was observed that the smart youth who bet on wires entirely to the east of the office won nearly all the money, and it was found afterward that the storm passed over in that direction.

Programme of the Next Telephone Meeting.

At the St. Louis meeting of the National Telephone Exchange, September 7th, Secretary Barney announces that besides the annual address of the President, and the general report of the Secretary, the following papers will be read and discussed at the meeting, viz.:—"Long Distance Telephoning," by A. S. Hibbard, Esq., of the Wisconsin Telephone Company. "Legislation of the past year," by H. L. Storke, Esq., of the Hudson River Telephone Company. "Cables and Underground Work," by C. N. Fay, Esq., of the Chicago Telephone Company. "Statistics," by the Secretary. "The necessity of protecting telephone exchanges, circuits and appliances from the destructive effects of intense electric currents and discharges," by Thomas D. Lockwood, Esq., of the American Bell Telephone Company. "Underground work in Brooklyn," by W. D. Sargent, Esq., of the New York and New Jersey Telephone Company. Several other papers are partially promised.

Several proposed changes in the Constitution—laid over from the last annual meeting—will come up for action. If adopted, the several articles and sections amended, will read as follows:—the changes being in italics.

"Art. XIV. Sec. 1.—The admission fee shall in all cases be ten dollars, to be paid on signing the Constitution. The annual dues shall be *fifty* dollars for each vote now had or that may be hereafter acquired under the Constitution, and shall be payable yearly on or before the first day of July in each year." (Proposed by the Executive Committee.)

"Art. IV. Sec. 1.—The officers of this Association shall be a President, Vice-President, Secretary, Treasurer, and an Executive and Advisory Committee, who shall, with the exception of *the Secretary and* the members of the Advisory Committee, be elected at each annual meeting of this Association, and shall hold office for one year, or until their successors are duly elected and qualified. *The Secretary shall be appointed, for the ensuing year, by the newly-elected Executive Committee.* (Proposed by the Executive Committee.)

"Art. XVII. Sec. 1.—*Any person may become an honorary member of this Association by a vote of two-thirds of all the members present at any regular meeting, such election to be by ballot.*" (Proposed by Mr. E. J. Hall, Jr.)

"Art. XVIII. (Additional Article.) Sec. 1.—*Any person or corporation actively interested in the objects of this Association may become an associate member of the Association by a vote of a majority of the members present at any regular meeting.*

"Sec. 2.—*An associate member shall have no vote in the meetings of the Association, but shall be entitled to all the other privileges of regular members, and shall be subject to the same dues and assessments.*" (Proposed by Mr. E. J. Hall, Jr.)

The following change in the By-Laws was proposed at the last meeting, by Mr. H. L. Storke, and will come up for action. It is an additional section to Article III.

Sec. 5.—*The Secretary shall, under the direction of the Executive Committee, procure and compile for the use of the Association such statistics relating to the Telephone business as have heretofore been furnished by the various committees of this Association.*

*** In a recent issue of the Evansville, Ind., *Tribune*, we find the following concerning the organization of the "Wind" Telephone Company of that city: "The projectors take great pleasure in stating to the public that the books for subscription to the Wind Telephone Company, of Evansville, Ind., are now open. The capital stock is 10,000 shares at $100 each, but no one can subscribe for more than 50 shares in one name. Owing to the stringency in the money market one per cent. of the capital stock is called at this time, payable in the notes of the subscribers, without valuation or appraisment laws and attorney's fees. Threatened law suits by the American Bell Telephone Company will be successfully resisted by pleading a suit against them in Ohio. This opinion was obtained from a Third street lawyer, and is to be paid for in stock after organization. All risks of infringement will be guarded against by a bond given by the Stickettoem Company, of Chicago, collaterally secured by Confederate bonds.

New England Telephone Matters.

At a meeting of the directors of the New England Telephone Company held last week, a dividend of ¾ per cent., or 75 cents, was declared, payable August 16 to stock of July 31, the books to be closed August 2 to 12, inclusive. This is the second dividend under the February agreement, and makes $1.50 per share. The following is the company's statement for the quarter and half year.

LIABILITIES.

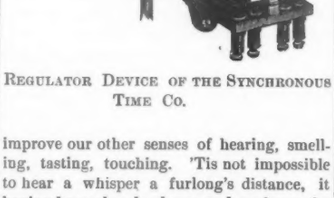
Drafts in transitu	$ 44,850 72	
Employes' aid fund	2,383 14	
Bills payable at mine, wages and supplies	126,618 70	
Machinery contracts, "estimate."	270,000 00	
Railroad equipment	50,000 00	
New smelting works	200,000 00	
		$693,852 56
Balance		$1,776,025 36

Quarter June 30.	1886.	1885.	Difference.
Gross	$228,043	$233,236	Dec. $ 5,293
Expenses	168,858	165,034	Inc. 3,824
Net	$59,184	$68,301	Dec. $ 9,117
Construction	1,170	18,899	Dec. 17,729
Surplus	$58,014	$49,402	Inc. $ 8,612
Half year.			
Gross	$448,787	$462,959	Dec. $14,172
Expenses	325,696	324,369	Inc. 1,327
Net	$123,090	$138,590	Dec. $15,500
Construction	2,069	46,352	Dec. 44,283
Surplus	$121,021	$92,237	Inc. $28,784

In Telephone stocks, American Bell was steady at 209½ to 210; New England advanced ⅛ to 39¼ to 39½; Erie declined ¼ to 28; Mexican Telephone sold at 1¾.

The Telephone of 1664.

And as glasses have highly promoted our seeing, so 'tis not improbable but that there may be found many mechanical inventors to



REGULATOR DEVICE OF THE SYNCHRONOUS TIME CO.

improve our other senses of hearing, smelling, tasting, touching. 'Tis not impossible to hear a whisper a furlong's distance, it having been already done; and perhaps the nature of the thing would not make it more impossible, though that furlong should be ten times multiplied. And though some famous authors have affirmed it impossible to hear through the thinnest plate of Muscovy glass, yet I know a way by which it is easy enough to hear one speak through a wall a yard thick. It has not yet been thoroughly examined how far Otocousticons may be improved, nor what other ways there may be of quickening our hearing, or conveying sound through other bodies than the air; for that is not the only medium. I can assure the reader that I have, by the help of a distended wire, propagated the sound to a very considerable distance in an instant, or with as seemingly quick a motion as that of light, at least, incomparably swifter than that which at the same time was propagated through the air; and this not only in a straight line, or direct, but in one bended in many angles.—From Works of Robert Hooke, published in 1664.

Telephones in France.

They have a wholesome dislike in France of doing things by halves, says the *Pall Mall Gazette*. Take the case of the telephone. The time has come, it is very properly considered, for the State to resume its latent rights on the one hand, and on the other to extend the telephonic system throughout the country. Having come to this conclusion, the French Government is going to give effect to it as follows: All the telephonic lines in France are to become the property of the State, but are to be worked under its surveillance by a company which is to buy out all existing interests. The company is further (1) to provide gratuitously telephonic communication to every commune in France which has not already a telegraphic office; and (2) to every town from which 30 subscriptions may be guaranteed. The advantages thus given to the country will be very great. In the first place, all the rural districts which are at present shut out from the telegraphic trunk lines will be put into communication with them by telephone. Telegraphic messages, which are now transmitted to these villages by special messenger at considerable cost, will in future be sent on by telephone without any extra payment. Then, in the second place, towns of the second and third rank which have not yet started a telephone will be given one. Among the places which will be benefited in this way are Avignon, Montpellier, Toulouse, Nimes, Dijon, Macon, Amiens, Boulogne, Caen, Rennes, and Orleans. The price of subscriptions in towns where the telephone is already installed is also to be reduced—in Paris from £24 a year to £16, and in provincial towns from £16 to £12. The advantages to the public and to the State (which gets the possession of the whole telephone system for nothing, the concession to the new company being for 35 years only) are obvious; whether the arrangement will be equally advantageous to the company remains to be seen. In any case it is not to be allowed to reap too much profit, for as soon as it begins to pay more than 6 per cent. dividend 15 per cent. of its surplus profits is to go to the State.

The Synchronous Time Company of Boston.

The system of this company comprises a correct standard clock, and a wire leading from this to any number of subsidiary clocks, of various descriptions, at whatever distance may be desired, one mile or fifty.

Over this wire an electrical impulse is sent periodically (usually hourly) from the standard clock, regulating the others by changing the center of oscillation according as the rate of each is fast or slow.

This is the only known system of regulation of clocks from a distant point.

Hand-setting devices which have hitherto been used do not regulate, and the time indicated by them is correct only at the instant when the hands are set.

This apparatus will ensure the correction of any errors whenever an impulse is sent over the line—the regulation proceeding in usual course. This is an important feature to jewelers and those requiring absolutely correct time and steady rate, as it enables the correction of the errors of a standard or observatory clock to be followed at once, without changing the rate, if it be correct—in short, ensuring both correct time and correct rate.

The device adopted by this company, as will be seen by reference to the cut on this page, can be applied to the pendulum without interfering with the works of the clock.

It regulates the clock through the pendulum, or controlling apparatus of a marine clock, which has never been affected from a distant point before.

The regulating device shown is in circuit less than a minute before and after the instant when a current is received from a master clock. One electric impulse is sent over a wire from the master clock hourly, or at any desired interval. By simple means, according as the clock in which this device is placed is fast or slow, the current is com-

pelled to pass through one pair of coils or the other.

The toothed wheel is turned one step to the right or left by palls on the post above the armature according as the armature is attracted toward either pair of coils. The upright screw is turned with the wheel, and in turning moves the nut up or down, which raises or lowers the end of the arm, and consequently slides the two pins up or down the suspension-spring, thus regulating the length of the swinging portion of the pendulum.

As the regulation is performed every hour if desired, it follows that the result is much finer time than in ordinary regulation manually and at irregular intervals.

The devices can be applied to all kinds of clocks, thus presenting a universal field for their use. They are kept in stock in complete order to screw into ordinary clock cases having dials from six inch upward, but for very small clocks or tower clocks special forms wil be required. They are now working in clocks made by the Seth Thomas Clock Co., New Haven Clock Co., E. W. Welch & Co., E. Howard Clock Co., Telegraphic Time Co., Pond & Co., and others.

The wires ordinarily used between police stations, fire alarm stations, school houses or departments of a municipality or company can be utilized for the purposes of this system without change in the ordinary apparatus or interference with the routine of business.

As the electrical apparatus is cut out of circuit at all times, excepting a few seconds before and after the instant when the regulating current is sent, it is evident that there is minimum liability to interference from crossing with other wires, and the general application of the system to district telegraph and telephone lines is practicable. The devices are now in use upon exchange telephone lines without interference with the legitimate purposes of each, and no changes in the apparatus.

All of the clocks upon a railroad can be absolutely regulated by this system by using the telegraph wire for one-half minute as often daily as desired, and much more reliable results obtained than by the method at present generally adopted of sending signals by which each operator regulates the clock at his station. A switch in each local telegraph circuit will ensure the regulation of a clock so connected by the correct impulse sent from the standard clock of the road.

When the wire breaks no interference is occasioned in the running rate of the clock, which has already been regulated more closely than can be done by ordinary means.

If the subscriber desires to discontinue the use of the device it can be removed, and the clock left in as good order as before it was attached.

These devices are owned and shipped by the parent company, ready to screw into the clock-case, and are provided with an adjustable arm to facilitate application to the suspension spring of the pendulum, or regulating apparatus of a marine clock.

Strength of Submarine Cables.

A submarine cable, according to the *Manufacturer's Gazette*, is by no means of uniform strength, the thickness depending to a large extent on the depth of water. For instance, a shore-end in the shallowest water, and subject to the greatest danger from the anchors of vessels, will be the heaviest portion, sometimes going as high as 27 tons to a knot. In forming the shore-end cable, the core is covered with hemp and a double sheathing of iron wire, the inner sheathing being of 12 wires of a diameter of 0.165 inch, and the outer sheathing 14 wires, with a diameter of 0.280 inch. The outside is covered with hemp yarn and bituminous compound, the whole weighing about 16 tons per nautical mile. A portion of the intermediate cable is covered with 12 wires, 0.252 inch in diameter, weighing in all 5 tons; another portion is covered with 12 wires, 0.165 inch in diameter, weighing about 3 tons. The deep sea is covered with 12 steel wires, 0.084 inch in diameter, and again covered with tape and 20 hemp cords, each of the steel wires being covered with tape and preservative compound. The steel wire has a breaking strain of 84 tons to the square inch. By adding the hemp cords, the tensile strength is increased, and the specific gravity reduced so as to enable the cable to be laid in very deep water. The total breaking strain of this cable is about 6 tons, and it will bear about 10 miles of its own length in water.

Thermostat and Push Button Combined.

This very simple, effective and durable invention of Messrs. Partrick & Carter, Philadelphia, commends itself. It is a regular push button, but having inserted in the knob a disk of fusible metal, so arranged that when affected by heat 110°, the disk softens, allowing the spring of push to come into contact with an extension of the lower contact strip, thus closing circuit on any mechanism it may be connected to. It is applicable to all purposes or uses where a thermostat is required, such as in hotels, factories, warehouses, etc., and the wires and connections are constantly being used as a call; or the connections, wires, etc., can be tested at any time by merely pushing on the button. A cut of it is shown on this page.

The Underground Work in New York.

Final arrangements have been made between the contracting company and the Electrical Subway Company, of this city. At the meeting of the Commission last week, the first particular specification was issued as follows:

The contracting company is authorized and directed to begin, within three weeks from the date of these specifications, the construction of a subway at Twenty-third street and Sixth avenue, on the easterly side of said avenue, six feet from the curb, and north along the line of the avenue to Fifty-

THERMO PUSH BUTTON OF PARTRICK AND CARTER.

uinth street, and prosecute the work with due diligence. Said construction to conform in all respects to the general specifications as to excavation of trench and refilling the same, and tests to be made after conduit is constructed, the foundation of conduit, joints of conduit manholes and distributing conduits.

The form of the conduit shall be rectangular, and shall consist of two sections containing twelve holes or ducts, each of 2½" diameter, laid side by side on the same foundation, breaking joints so as to bring the collar of each pipe near the center of the pipe alongside of it.

The composition of the conduit shall be satisfactory to the chemist, and shall be tested and made comformable to requirements of the report of the Commission adopted June 30th, 1886.

The contracting company is called upon to furnish to the Commission, within one week, plans and profiles, with detailed information of the route above designated for the construction of the conduit, showing the obstructions of the streets and avenue, and to furnish and file with the Commissioner of Public Works, of New York City, a duplicate of the above-described maps.

The engineers were then directed to prepare specifications for the work in other portions of the city, and also for a conduit for electric light wires. Both the engineers and chemist were authorized to make proper disbursements in the carrying out of their respective portions of the work, which means the employment of inspectors and the purchase of instruments, President Flower generously offering to advance the money for such expenditures to the amount of $1,000. The officers were also directed to continue their experiments to ascertain if any other shape of conduit is better adapted for other districts than the one already selected. The following resolution was adopted:

Resolved, That as soon as the samples of material to be used by the contracting company shall have been approved by the chemist, we shall give a public test of the strength of said material, and of such other material as he shall see fit, on a day which he shall find convenient.

The Commission then adjourned, subject to the call of the chairman.

Mr. Lauterbach, attorney for the Construction Company, says they are already to begin work, and that they have commenced on the patterns or moulds for the conduit. They hope to be ready to begin laying the subway at the corner of Sixth avenue and Twenty-third street within three weeks, the limit of time under their contract.

An Electric Fool Guard.

An earnest and rather hungry-looking man, whose clothing was considerably worn, especially about the elbows and beneath the coat tail, leaned against the railing of the Brooklyn bridge promenade the other day and made pencil marks on the back of a buff envelope. Presently he drew a long breath, and piped: "I've got it!"

"Did you speak to me, sir?" asked a man who had been standing near and watching a lighter trying to beat against the tide.

"Yes, and to all the world beside," was the answer, in a tone of triumph. "I have got it, and the bridge authorities can't get along without it. It is the only thing that can ever be thought of that will answer the purpose. It is the electric fool guard. Now that one fool out of two has lived to boast of jumping from the bridge, this stretch of sixteen hundred feet will be a regular swarming place for them. If the bridge trustees put on policemen enough to guard the railing in the daytime, the fools will come in the night, and it will take a policeman to every fifty feet of the roadway to prevent fools and cranks from riding on the bridge in closed carriages, and hopping out of the doors and over the railing. What the bridge authorities have got to have is something which will guard every inch of the railing every minute of the twenty-four hours, and the electric fool guard will do it.

"There is nothing to it," the man went on, with a deprecating gesture. "It's all in the idea. Any man can string a half dozen naked wires outside the railing in such a way that a man cannot climb over the railing without touching one or more of them. Let them be charged with a current just strong enough to double a man up and fling him back on the roadway. Then put up notices to drivers at each entrance to be careful not drive over the fools that will be flung in their way in a dazed condition. That's the whole scheme, and the cost would be a trifle—a mere trifle. I shall make arrangements today with the bridge authorities to have it put in operation at once."

.... There was a rumor in Wall street and in the exchanges that the Western Union versus the United Lines Telegraph suit had been settled for $70,000. Mr. Dwight, Townsend, secretary of the United Lines Company, was seen by a reporter, and said: "I wish to deny that rumor most emphatically. The suit cannot be settled otherwise than by paying 100 cents on the dollar. In view of the fact that Judge Lawrence decided that the verdict for damages only held good in New York, our counsel is preparing suits against the Western Union in the different States."

.... J. Elliot Smith, the capable superintendent of the Fire Alarm Telegraph, of New York city, sent a communication to the Fire Commissioners in regard to the precautions necessary in removing the central alarm apparatus from Firemen's Hall to the new headquarters in East Sixty-seventh street. The office plant at Firemen's Hall must, in a greater or lesser degree, be duplicated for this occasion. Temporary apparatus must be set up to avoid the possibility of a hitch, and some valuable apparatus must be purchased. So far as possible, the wires will be carried under ground in the neighborhood of the new headquarters. The transfer, new apparatus and placing the wires under ground will cost about $20,000. The Commissioners approved of all of Mr. Smith's suggestions.

TELEGRAPHIC

.... The firm of Hernstein & Prince, of St. Louis, have been awarded the contract to furnish the Fire Alarm and Telegraph Department of that city with over thirty miles of telegraph wire.

.... President Purroy, of the New York Fire Department, exhibited at the headquarters of the department a portable electric hand lantern, for use in burning buildings in which the smoke is so dense that an ordinary light will not burn. It is the invention of a Paris electrician, and is said to be similar to those used in the fire department of that city. It consists of a six-cell battery and a seven candle-power incandescent lamp. The lantern is to be tested by the New York firemen.

.... In view of the liability of accidents in the running of cable cars, the Philadelphia Traction Company are introducing a new electrical system on their Market street branch. The plan consists in laying leaden tubes containing telegraph wires alongside the conduits; a simple alarm box will be placed in each manhole along the route of the cable cars. This affords instant communication with the engine-house at Twentieth street, and, when an accident occurs to the cable necessitating the stoppage of the engine, an alarm can be sent at once to the station, and, through an arrangement of signals, any information that is needed to meet the emergency can be instantly forwarded.

.... All New England and the northern portion of the Middle States were treated one night last week to a beautiful display of northern lights, the most vivid witnessed since the memorable exhibition during the great storm of 1882. The effect upon the wires was quite serious. All the telegraph companies report the electrical storm the severest the northeast of Boston, through Maine towards the maritime provinces. The Western Union was almost shut out from that region between 7 and 10 o'clock, while to the West the effect was hardly noticed. Even upon such local circuits as the district messenger and telephone service there was much trouble. Many call boxes where the current was weak were rendered temporarily useless, and several districts of the telephone service was cut off from the city. Toward Woburn the telephones could not be worked for several hours, and in the city a large number of individual instruments were out of circuit. After 11 o'clock the troubles began to decrease.

.... A telegraphic blunder—that queer mixture of Morse characters that the elves sometimes bring about—is usually soul-harrowing to the operator as well as to the party receiving the message. A gray and grizzled operator, as he listened to the coy clicking of the sounder in one of the railroad offices said: "I remember quite a number of telegraphic 'bulls,' they are usually made by new hands at the keys, although at times the old 'uns are caught napping. An operator recently received a message reading: 'Mackerel filter Tooeckrk first freight.' A repetition produced this wonderful transformation: 'Mackerel file to O. C. Clark first freight.' Several years ago, during extraordinary excitement in Congress, occasioned by heated political and bitter partisan debate, the metropolitan newspapers were startled by receiving word that the Republican side of the House had accepted a 'game of ball.' Not being in a ball playing mood, the words 'gage of battle' were fittingly substituted. Another terrific instance of what a 'plug' operator can do was shown in a message received by a traveling salesman. It read, 'Cog hog quick, Carrie has Spencer's menagerie.' He could not understand what his daughter wanted with a menagerie, until he received a correct copy which read, 'Come home quick, Carrie has cerebro spinal meningitis.'"

ELECTRICAL AND SCIENTIFIC

* * As an experiment, a piece of iron was recently rolled in the new Falcon mills at Niles, Mich., to ascertain the extreme thinness it was possible to obtain. The result was a sheet about the substance of writing paper—in fact, 150 sheets would be required to constitute one inch of substance.

* * H. L. Shepard's Foot Lathe Works, 134 East Second street, Cincinnati, is a beehive of industry. His shipments are increasing to all parts of the United States and many foreign countries. Mr. Shepard is a veteran in the business, and his lathes are of national reputation.

* * "Nothing but the figures should ever be allowed on the dial of a steam gauge." We clip this from "Useful Hints and Information for Steam Users." If some one would enact this maxim in every State in the country, engineers would bless them. Usually the most prominence is given to the maker's advertisement on a steam gauge.—*Am. Machinist.*

* * A new concrete now being used quite extensively in France is composed of eight parts sand, gravel and pebbles, one part powdered cinders and one and a half parts unslaked hydraulic lime. These materials are thoroughly beaten together, the mixture forming a concrete which sets almost immediately, and becomes in a few days extremely hard and solid.

* * Professors Ayrton and Perry, the English electricians, have accidentally observed that on amalgamation, or coating with quicksilver, brass expands; so that, if one side only is amalgamated, a plate of brass becomes curved. They imagine that this may be the primary cause of the phenomena of the Japanese "magic mirror," which has cast on its back a pattern that is quite invisible on the polished face, yet is mysteriously distinct in the patch of light reflected by the mirror upon a screen. Amalgamation would affect the thinner parts made by the pattern more than the rest of the plate, giving the mirror the imperceptible unevenness that becomes plainly apparent in the reflected image.

* * The female spider is fiercer and larger than the male. In one tribe of spiders the female is 1,300 times larger than the male. The spider's thread is composed of innumerable small threads or fibers. One of these small threads has been estimated to be one two-millionth of the thickness of a hair. A scientific experimenter once drew out from the body of a single spider 3,480 yards of thread or spider silk—a length a little short of three miles. Silk may be woven of spider's thread, and it is more glossy and brilliant than that of the silk worm, being of a golden color. An enthusiastic entomologist secured enough of it for the weaving of a suit of clothes for Louis XIV.

* * The University of Heidelberg, in conferring an honorary degree upon A. Graham Bell, apparently recognizes his claim to be the original inventor of the telephone. This is a terrible slight upon the memory of Philip Reis, the Teutonic experimenter, who has been credited by the Pan-Electric ring of speculators, and by Van Benthuysen and his lawyers, with having invented process and instrument. We shall probably be informed presently, by this combination of telephone rivals who hope to profit by the Government suit, that the Bell monopoly has corruptly influenced the University of Heidelberg, and obtained in its own interest this honorary degree.—*N Y. Tribune.*

* * In illustration of the diffusion of gases, Mr. W. Anderson, the English investigator, recently gave some good examples through porous media of inconceivable fineness. When two gases, such as hydrogen and air, are separated by a porous medium, they immediately begin to pass into each other, and the lighter gas passes through more quickly than the heavier. He showed a glass tube, the upper end of which was closed by a thin slice of cork, the lower end dipped into a basin of water. The tube was filled with hydrogen, which is about 14½ times lighter than air; consequently, it left the tube through the cork more quickly than the air could enter in by the same means, and the result was a partial vacuum in the tube, and a column of water drawn up, proving that the cells of cork are eminently pervious to gases. The pores in the cell walls appear, however, to be too minute to permit the passage of liquids.

Belting Power.

The following particulars of the leather belting for driving the machinery in the electric-light department of the Inventions Exhibition, held in England last year, may be of interest, as giving the velocities and powers in a particular case: No. 1 belt, 70 feet in length, 10 inches wide, running at 2,585 feet per minute, transmitted 120 indicated horse-power; No. 2 belt, 73 feet in length, 15 inches wide, running at 2,585 feet per minute, transmitted 170 indicated horse-power; No. 3 belt, 60 feet in length, 16 inches wide, running at 3,270 feet per minute, transmitted 200 indicated horse-power; No 4 belt, 86 feet in length, 24 inches wide, running at 2,585 feet per minute, transmitted 350 indicated horse-power; No. 5 belt, 86 feet in length, 15 inches wide, running at 2,585 feet per minute, transmitted 170 indicated horse-power; No. 6 belt, 86 feet in length, 15 inches wide, running at 2,585 feet per minute, transmitted 170 indicated horse-power.

A New Application of Electrical Power.

We have before had occasion to place on record the work done by means of electricity at Hatfield, both at the Marquis of Salisbury's house itself, and on the estate. In addition to the various operations of lighting, pumping, pile-driving, weed-cutting in the river, and others, another application of the power has just been perfected by Mr. Shillito, the resident electrician of the estate, which, as far as our experience goes, is quite novel. Ensilage is being stored on a large scale for the use of stock at one of the farms, where, for this purpose, some of the old farm buildings have been converted into silos; this year it has been decided to chaff the green food before placing in the silo, and this arrangement has necessitated the placing of the chaff cutter used in cutting up the rough grass some 20 feet above the ground. The electrical power is used not only for driving the cutting machine, but also for elevating the grass to the level of the cutter. Some four tons of rough grass are raised and cut per hour by this means. The generator, a 16-light Brush machine, driven by a water-wheel, is situated a mile and a half distant, on the banks of the River Lee; the electrical power being transmitted to one of Siemens Brothers D 2 type, specially wound to work as a motor with the Brush machine. The same source of power is also brought into use in working the elevators at the various hayricks on the estate.—*London Engineering.*

——A first class lubricating oil should stand exposure to a temperature of boiling water in a water bath of six hours, without showing any appreciable loss by evaporation; its flushing point should not be below 300 degrees, and it should not congeal at a temperature of several degrees below zero. For cylinder oils, whether pale or black, the flushing point should not be less than 500 degrees.

—— A new company, called the Gas and Electric Light Company, of Waltham, Mass., was organized Saturday night by ten of the stockholders of the present gas company. The president of the new company is J. R. Farnum; secretary and treasurer, G. A. Stearns; directors, J. R. Farnum, A. T. Lyman, Lowell Clark, J. B. Gooding, Francis Buttrick; other organizers, C. A. Welch, Chas. Houghton, Augustus Flagg, and Mr. Capen. All are stockholders in the gas company, and a number are directors. The capital stock is $20,000, of which $14,000 is already taken.

Lighting the Lachine Canal.

The electric light system at the Lachine canal has been in operation for several days, and has proved so far to be successful. This plant was put in by the Royal Electric Light Company under contract with the Dominion Government. The station is erected on the banks of the canal, and is admirably well located to obtain a bountiful water supply, which is the main motor of the whole system. It is built on a flume with a waterfall of ten feet from which a 225 horse-power is received. The machinery is put in motion by three (56 inch) water wheels of 75 horse-power. The intention is to have two of these in operation to light the canal and the wharves and have the other one ready in case of accident. The building is lighted by twelve 32 candle-power lamps. It is supplied with the essentials which go to make up a first class-dynamo station. The indicators of the state of the light in the different districts are very good. One hundred and seventy-four lamps of 50 candle-power have been placed along the canal banks. Starting at the foot of the canal locks one and two are lit up on both banks. The remainder of the canal as far up as Seigneurs bridge is lit up on one side only. This is believed to be sufficient for the present requirements. The wires cross the canal under water at four different points. The total distance covered by these wires is four miles. There are on the average 40 lights per mile. The improvement is estimated to have cost about $12,000. It is most probable that the Lachine end of the canal will be provided with electric light before long.

Underground Wires in Buffalo.

"The old cocks crow and the young ones learn," is as true in electrical matters as in any other branch of knowledge. Now that New York has taken some decided steps towards wire interment Buffalo comes to the front.

In the Common Council there the other night, somebody had a resolution up which was passed, but disapproved by the Mayor, authorizing the erection of an illuminated sign on Main street. His Honor said: "In using the term obstructions I mean to include not only signs at the curb line of the streets or projecting more than three feet from buildings over the walks, but telegraph and telephone wires," etc.

The *Commercial*, commenting on the remarks of the Mayor, says:

"The Mayor has taken the right view of this matter, and the *Commercial* and a host of citizens will heartily support his efforts, or any proper movement designed to prevent further disfigurement of our finest streets, and the dangerous obstruction of our business thoroughfares.

"Buffalo is becoming too large a city to tolerate much longer the cool appropriation of its streets by the telegraph and telephone companies whenever or wherever these corporations see fit to plant their poles and stretch their wires. Linwood avenue, one of the noblest streets in the whole city, has been shamefully disfigured by these poles, and within a few days Allen and North streets have been marred in the same way. In fact, very few of the principal thoroughfares have escaped the misfortune of having these unsightly masts planted along the curb, on one side or the other. The new poles erected by the telephone people are immense affairs, and proportionately obnoxious. New York has taken the bull by the horns, after vain efforts to make the companies put their wires under ground, and is about to do the job itself. When it is shown that the underground system works well in New York, public sentiment in Buffalo will be ready to compel the removal of the wires and poles from the public thoroughfares here. In every large city all wires should be laid in the trenches under ground, and the time is not far distant when they will be so laid. The wires and poles must go!"

Buffalo seems to be aroused on the underground question, and will follow New York as New York is following Chicago.

Digest of U. S. Patents on Storage Batteries.

REFERENCES TO FOREIGN PATENTS OBTAINED THEREON.

(SIXTH PAPER.)

1883.

284,342. Sept. 4, 1883. Filed Dec. 5, 1882.
Cornelius T. Tompkins, N. Y.

Within a containing vessel is a porous cup filled with a mass of pulverized carbon and graphite and within which is imbedded a strip of silver to act as a conductor. This forms the negative element. The positive element is composed of lead in the form of fine fibers arranged parallel and long enough to reach the bottom of the jar, the usual electrolytic fluid is employed. The claim relates to the negative electrode.

284,343. Sept. 4, 1883. Filed Feb. 26, 1883.
English pat., No. 1,587, April 1, 1882.
English pat., No. 2,263, May 11, 1882.
English pat., No. 5,601, Nov. 24, 1882.
French pat., No. 151,328, Sept. 30, 1882.
French pat., No. 152,067, Nov. 13, 1882.
Alfred Tribe, London, England.

The elements are supported in grooved frames of non-conducting material, within which are located metallic conductors. The conductors in the frame which supports the negative element is so treated as to be converted into a sulphide, anidide or phosphide of the metal of which it is composed, and thereby have its surface rendered electro-negative (?) prior to the insertion of the material of the element. The conductors of the positive plates are first rendered porous. The material employed to form the negative element is preferably per-oxide of lead, or one or more of the lower oxides, mixed and made into a paste with sulphuric acid and water, which is moulded to the required shape, inserted into its frame, and allowed to harden, and afterward encased in an envelope of cotton or other porous fabric. The positive element may be prepared in a similar manner, the fibrous covering being dispensed with.

284,577. Sept. 4, 1883. Filed Aug. 10, 1883.
E. T. & E. E. Starr, Philadelphia, Pa.

Construction same as 268,308. Mentions use of palladium for positive plate. Claims are for a compound electrode composed of two or more perforated plates and active material interposed between said plates.

285,529. Sept. 25, 1883. Filed April 19, 1883.
Chas. J. Van Depoele, Chicago.

Construction same as 276,099. Claims the method of treating the elements, consisting in subjecting them to the action of dilute nitric and sulphuric acid, next precipitating by electrolysis salts of lead upon the electrodes—then washing to free from nitric acid, and finally forming by electric action.

285,807. Oct. 2, 1883. Filed Jan. 22, 1883.
English pat., No. 4,625, Sept 28, 1882.
Sir George Lane Fox, London, Eng.

Strips of lead foil are super-imposed one upon the other, or arranged vertically side by side, and between them is placed sand, powdered glass, or other inert material, so as to keep the strips slightly separated and yet leave capillary interstices between the granules to allow the admission of the acid solution to surfaces of the several laminæ. The strips are connected together top and bottom, or at their sides by soldering, and a strip is carried up to form a terminal. The plates are rendered active by the Plante method.

286,259. Oct. 9, 1883. Filed Sept. 3, 1883.
Charles F. Brush, Cleveland, Ohio.

Relates to a method of treating the electrodes, which consist of alternately heating and cooling them after, and during, or in the intervals, of the electro-chemical charging action. The temperature of the plates is raised to from 200 to 212 degrees Fahr. and is maintained for from four to six hours, after which the electrodes are allowed to cool, and are then charged, the process being repeated as often as may be necessary, the object being to facilitate the formation of the plates.

289,386. Dec. 4, 1883. Filed Aug. 24, 1883.
Willard E. Case, Auburn, N. Y.

The electrodes are formed of an alloy of lead and a non-oxidizable metal, such as bis-

muth or antimony. The claims are for the process, consisting in melting the materials and while in a melted state, stirring the same, until it becomes cooled to a plastic or finely-divided condition, then moulding.

Public Lighting in Philadelphia and Other Electrical Work.

"Philadelphia obtains electric lights cheaper than any other large city in the country," said Chief Walker, of the Electrical Department, recently, in speaking of the apparent increase of 400 per cent. in the appropriations to his department during the past three years. "The average cost is less than 55 cents per night a lamp, and the truth is most of the companies that do lighting for the city lose money by it. Many of them make their figures very low, for the privilege of being allowed to place their wires upon the city poles. There are 352 lights paid for by the city, and they cost $10,000 less than they would in most other cities.

"As to the expenses of the department, the increase since 1884 is more apparent than real, and what there has been is for improvements rather than maintenance. The appropriation for 1884, when we did not have charge of the electric lighting, was $35,000, and in 1885, when it was transferred to us from the Police Department, the appropriation was $84,467. Although I asked for $178,114 for 1887, I do not suppose I will get that much. This year we had $104,995. Of this, $70,664 is for the maintenance of lights already up, and I have asked for $25,000 for new lights next year.

"The odd $70,000 is divided among a number of companies whose prices for lamps vary. Thus the Brush Company receives 52 cents a night for its lamps on Chestnut street, 58½ cents for those on Poplar street, and 55 cents for those on Lancaster avenue. The United States Company is paid 48 cents a night for its lamps on North Broad street, 59½ cents for those on Delaware avenue, and 62 cents for those on Federal street. The Northern Electric Light Company obtains only 39½ cents for four lights on Second street, above Callowhill, as the wires are strung on city property. It is paid 48 cents for its lamps on Girard avenue. A company in Frankford, whose lights only burn half the night, is paid 30 cents a lamp. In Germantown the price is 55 cents. The Thomson-Houston Company, whose lights are on Columbia avenue, is paid 48 cents a night. The average price for all the lamps is, as I said, less than 55 cents a night apiece.

"The operating expenses of the Electrical Department have increased very little, not over $4,000, since 1884, notwithstanding the great amount of extra work we have had to perform. The number of fire-alarm boxes has increased from 150 to about 500 within that time; the fitting up of the Police Patrol service has been put upon us; telephones have been placed in all the fire-engine houses and hospitals, and many improvements have been made. Certainly, the expenses of the Electrical Department cannot be complained of as extravagant."

Mr. Goff's New Company.

The New York *Tribune* contains the following: "The American Electric Manufacturing Company was the first to apply to the Consolidated Electric Subway Company for space for its wires in the main portions of New York and Harlem. This is the company of which Edwards H Goff is president and general manager. I am told that for several months Mr. Goff has been secretly perfecting some very important improvements in electrical machinery and apparatus which which will be of great value. I am also informed upon reliable authority that Mr. Goff has made considerable headway in the formation of a syndicate of capitalists to construct gas and electric light plants in cities throughout the United States. A gentleman in this scheme said yesterday that the syndicate would represent at least $3,000,000 of cash capital with unlimited credit. The American system of electric lighting will no doubt be adopted by the syndicate as the best for it to use in the combination."

Electric Baths in Eye Diseases.

Professor Denti, writing in the *Annali di Ottalmologia*, states that he has found electric baths and douches very valuable in several ophthalmic affections, especially in those which refused to yield to more ordinary methods of treatment. His apparatus consists of a vessel of water placed at a height of two meters above the patient's head, a constant current battery of thirty cells, and a glass or ivory box without a bottom. This box is fitted on to the eye. It contains a metal pipe communicating by an india-rubber tube with the water vessel, from which the box can be filled with water; an efferent non-metallic pipe is also provided. The metal pipe is connected by wire with one pole of the battery, the other electrode being placed on the forehead or crown of the head. The sittings are of from four to six minutes' duration. For baths eight or ten cells are used, for douches twenty or more. No unpleasant effects have ever been observed, the stimulating action being only sufficient to produce a slight degree of hyperæmia. The author finds that the baths are best in deep-seated affections, such as those of the vitreous or of the optic nerve; the douches are useful in more superficial affections, such as those of the conjunctiva and cornea. Dr. Denti tried the electric baths in six cases; four of atrophy of the papilla in different stages, one of disseminated cloudiness of the vitreous, and one of double ulcerative blepharitis. The papillar atrophy was benefited most when it was slightest. In one case of atrophy accompanying disease of the spinal cord, the intraocular affection was, or appeared to be arrested. The patient with the cloudy vitreous was so much improved that, though at first he could scarcely distinguish large objects, after thirty sittings he was able to read ordinary print. The patient with blepharitis was completely cured. The douches were employed six times; in three cases of paralysis of the eye muscles, and in three of exudations remaining after ulcerative keratitis. One of the cases of paralysis was entirely cured, the other two being improved; and in the cases of keratitis the success was most marked, the exudation being completely absorbed.

—— Easton, N. J., is now being supplied with the arc lamps of the Western Electric Company for city lighting. The work of putting up the lamps commenced last week.

—— Electric lights are excellent bug exterminators. The man who cleans and carbons the electric lights in Bethlehem removed a half peck of bugs of various kinds and a bat from six lights. The bugs were weighed and tipped the scale at four pounds thirteen ounces.

—— During the past 14 months the British Admiralty has ordered more than 100 Willans engines for electric lighting on board ship. The Willans engine is of the rotary type, and has been very aptly described as a steam turbine. It was illustrated in the ELECTRICAL REVIEW, July 31.

—— The Mather Electric Company, which has grown from a force of two employees to 200, and largely increased its capital, has outgrown its quarters in the old factory on Sheldon street in Hartford, and is considering the advisability of a removal, advantageous offers being made from different towns and cities, including Manchester. This company is securing the success that wise business management and a good system are sure to bring.

—— An electric light has been suspended at the corner of Seneca and Fifth streets, making the neighborhood thereabout bright. An additional light will be placed in on one of the business houses in that vicinity soon. It is a good sign to see these improvements, and it means that the electric light company will not be necessitated to take down the lights already up as it was feared they might have to. The indispensable importance of these lights is so exactly patent to any one unless he be blind that it would be idle to discuss the project. — *Leavenworth (Kan) Times.*

—— The Salina Gas and Electric Light Company, with a capital stock of $60,000, has been organized in Kansas. The directors are E. W. Pike, Chicago; H. C. Cross, O. W. Waymire and D. M. Davis, of Emporia; William Martindale, of Madison, Kan.

—— The property owners and residents of the cross streets between Craig and St. Catherine streets, Montreal, are petitioning the City Council to replace the street gas lamps in those streets by the electric light. The electric light is growing in popularity with the citizens of Montreal.

——Bamford Bros., of Paterson, N.J., will hereafter light their silk mill, which has thus far been served from the station of the Arnoux Company, by an isolated plant of the American system. They thus secure a white and steady illumination, which is very favorable for their work.

—— Twenty-two reading columns of a Cincinnati paper are devoted to the showing made by a representative of the gas interests of the failures of the electric light. The three letters *Adv.* at the end of the article would indicate that the business manager of that journal knew a good customer when he saw one.

—— The Consolidated Electric Light Company of Maine is negotiating for the establishment of a plant in Biddeford and Saco. It is understood that a large number of merchants will patronize it. The service machinery will be located in Holmes & Roberts's mill on Water street, Saco. The building is now being put in readiness.

—— An item from Lima is to the effect that the petition of Mr. Delhorme for permission to introduce an English system of electric lighting in Callao has been refused, the privilege recently obtained by an American company for the introduction of an American system in various cities of the republic being recognized by the Government.

—— It is claimed that New Orleans has to-day more arc lights in proportion to population than any other large city in the country. Altogether about 1,800 lights burn nightly in the city during the business season. The cost per lamp per night for the street lights is 31½ cents—public lighting. This is furnished by the Louisiana Company.

—— A Pittsburgh gentleman, in speaking of the use of natural gas in that city, says "Well, folks grew tired of simple logs, and now they have taken to making things of terra-cotta as well as asbestos, and putting them in grates to burn. You see, they perforate them so that little jets of flame come from all parts. One day last week I saw two life-like English bulldogs sitting in a fireplace, covered from head to foot with blue flames. Then, again, one grate I know of is fixed up with a chicken on her nest."

—— Mr. Geo. H. Wadsworth, who has been for several years actively identified with the electric lighting field, through his connection with the Boulton Carbon Company, now the National Carbon Company, of Cleveland, has resigned to accept a responsible position with the Cornell Platform and Coupling Company. Mr. Wadsworth had a host of friends in the electrical field, who will, one and all, be pleased to hear of his improved prospects, and wish him the success in railroad circles that his abilities and activity won for him among electrical workers. The REVIEW extends to Mr. Wadsworth its sincere well wishes.

—— The Westinghouse Electric Company, of Pittsburgh, have received an order for a 2,000-light electric plant for a western city. The plant will include everything in the way of boilers, engines, dynamos, wires, etc., and the Stanley pattern of incandescent lights. The same company recently received an order for a 2,000-light plant for Schenectady, N. Y., where the Stanley incandescent lights will replace gas in the street lamps. The Westinghouse Company are now bidding on plants for electric lights for about ten cities of different sizes in both the East and West. These range from 2,000 to 10,000 lamps in each town, and the company will, in case they get the contracts, furnish everything necessary for successful operation.

ELECTRIC LIGHT NEWS

—— The new electric light plant at Paterson, N. J., is greatly pleasing the citizens of that city.

—— The Excelsior Electric Light Company of New York will shortly instal in the iron works of Marshall Bros., Philadelphia, a ten light arc plant, after very sharp competition with the prominent systems.

—— The Solar Carbon and Manufacturing Company of Pittsburgh has recently closed a large order for their long-lived carbons, with the Germantown Electric Light Company of Philadelphia.

—— Mt. Vernon, N. Y., is advertising for bids for electric lighting, proposals to be opened September 1st. Mr. W. W. McClellan is chairman of the committee, from whom all information can be received.

—— The combined arc and incandescent plant of the Schuyler system continues to be an object of interest and satisfaction, to those who examine its latest installation at Bay Ridge, Md.; "the Coney Island of the South."

—— The Westinghouse Electric Light Company of Pittsburgh has secured through its Philadelphia representative, T. Carpenter Smith, an order for a 200-light incandescent plant for the Pennsylvania Bolt and Nut Works at Labanon, Pa.

—— The American Electric Manufacturing Company, of New York, has bought a large factory in New Haven. The building will be used by its new owners for the manufacture of dynamos and other electrical apparatus.

—— The Ridge avenue line of cars in Philadelphia were run between the station at Thirty-second street and South Laurel Hill by electric motors, and every car was filled with persons anxious to enjoy the novelty of a ride on cars moved by electricity, The cars ran smoothly and nothing occurred to interfere with travel.

—— The Brush-Swan Electric Company and the Thomson-Houston were competitors for electric lighting in Burlington, Vt., the contract finally going to the former company, The first order was for two Brush machines, but the order has since been doubled.

—— The new town of Montgomery, in Finney county, Kan., is deeply interested in what is thought to be an electrical well. An electrical flame, which casts considerable light, gathers every night at the top of the pump rod. It can easily be shifted by the motion of one's hand from one side of the rod to another, but immediately reappears. When strongest, it is several inches high. It gives a strong buzzing sound, increasing or decreasing as the flame is low or high. It is 102½ feet from surface of ground to the water, which is three and a half feet deep and inexhaustible. Hundreds of people visit the well every night. Mr. Bigelow, of Boston, should put his electrician in communication with this well.

—— The Millville Schuyler Electric Light Company, of Millville, N. J., has been incorporated for the purpose of furnishing that city with both arc and incandescent lights, and has secured an exclusive franchise for five years. The capital stock is $30,000, and the names of its officers are Stephen Holbrooke, President, and F. J. Melvin, Secretary and Treasurer. A suitable lot has been purchased for the station in a central part of the city, and the contract for the electric plant (combined arc and incandescent) has been given to the Schuyler Electric Light Company of Hartford, Conn. The steam plant will be supplied by the Ball Engine Company, of Erie, Pa., and will embrace a 100 horse-power steel boiler, and 80 horse-power Ball automatic engine.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING AUG. 3, 1886.

346,475 Insulator block for electric conductors; Thomas Hawken, Salem, Mass.

346,509 Electric circuit; Henry C. Spalding, Boston, Mass.

346,510 Electric circuit; Henry C. Spalding, Boston, Mass.

346,515 Electrical switch; Robert G. Sweeney, Terre Haute, Ind.

346,527 Electric motor; John Beattie, Jr., Westport, Mass.

346,528 Electric battery; John Beattie, Jr., Westport, Mass.

346,532 Electric alarm; Charles H. Crockett and Chancellor C. Allen, Boston, Mass.

346,533 Gas lighting device; Charles H. Crockett and Chancellor C. Allen, Boston, Mass.

346,561 Electric arc lamp for locomotive headlights; George C. Pyle, Dayton, Ohio, assignor to the American Electric Headlight Company, Indianapolis, Ind.

346,587 Electric alarm; Wm. L. Glanville, Auburn, N. Y.

346,609 Electrical annunciator; David Rousseau, New York, N. Y.

346,688 Underground conduit for electrical wires; Wm. L. Robinson, Philadelphia, Pa.

346,708 System of telephonic communication: Chichester A. Bell, London, County of Middlesex, England.

346,846 Telephone transmitter, Hermann Ehrlich, Jersey City, N. J.

346,865 Automatic telephone toll system; Phillip L. Rose and Gustavus Rein, St. Louis, Mo., assignors of three-fourths to Charles Hoyle, same place.

346,866 Toll collecting mechanism for telephone exchange systems; Phillip L. Rose and Gustavus Rein, St. Louis, Mo.

346,876 Electric annunciator target; Morris Ullman, Washington, D. C.

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A. C. FOWLER, C.E., was Examiner in the U. S. Patent Office from 1880 to 1885, in the Interference and Electrical Divisions.

ELECTRICAL PATENTS.
GEORGE H. BENJAMIN,
35 Wall St., New York.
Consulting Electrical Engineer,
Expert in Patent Causes,
Solicitor of U. S. and For.ign
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SPECIAL NOTICE.

National Electric Light Association,

SEMI-ANNUAL MEETING.

THE FOURTH MEETING—semi-annual—of the NATIONAL ELECTRIC LIGHT ASSOCIATION will be held at DETROIT, MICH., on Tuesday, 31st day of August, at 10 o'clock, A.M. Dues being payable in advance, all members are required to forward the same for the year 1886, by check or otherwise, payable to the order of J. F. MORRISON, President, Baltimore, Md.

Electric Light Companies and Manufacturers of Electric Light Apparatus, Supplies, &c., desiring to become members, must apply on or before August 31st, to the President, J. F. MORRISON, Baltimore, Md.

Members and others desiring information as to R.R. transportation rates will address J. F. NOONAN, Esq., Chairman Com. on Transportation, Paterson, N. J.

Special Hotel rates will be made known previous to meeting of the Association.

A. J. DeCAMP, Chairman Ex. Com.
Philadelphia, Pa.

WANTED.

An Electrician having a good practical, theoretical and general knowledge of most things electrical, is open to an engagement, preferably where his knowledge, gleaned by industry, research and long experience, could be usefully employed Address, "COMBINATION," care THE ELECTRICAL REVIEW, New York.

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Fig.259

Fig.255

Fig.260
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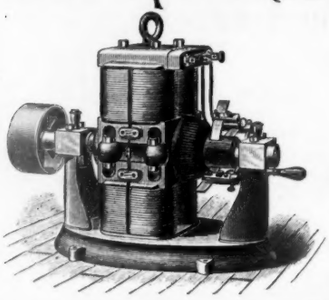

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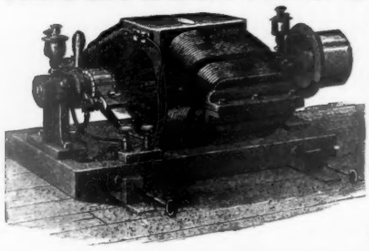

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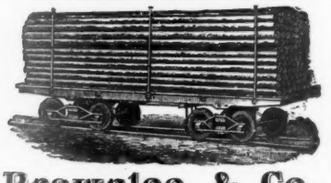

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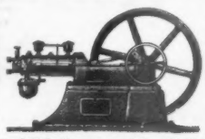

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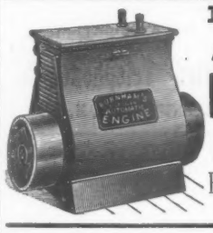

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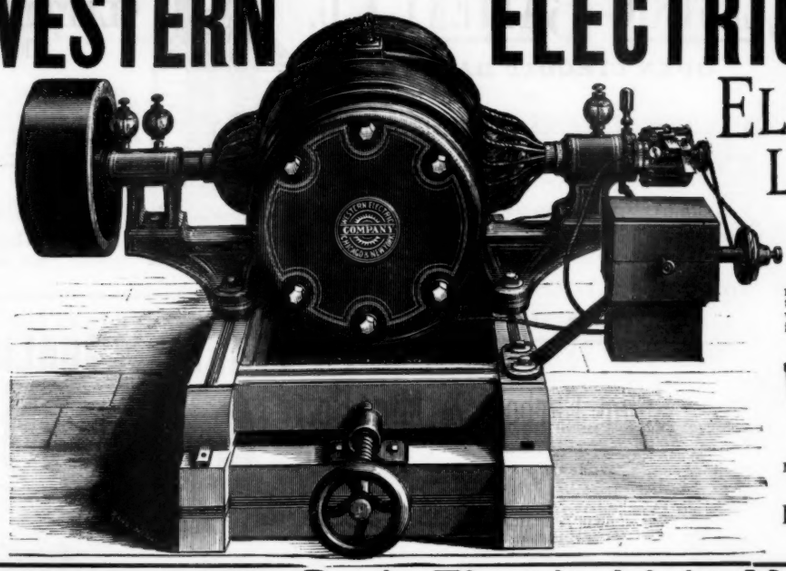

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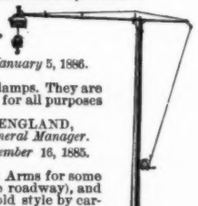

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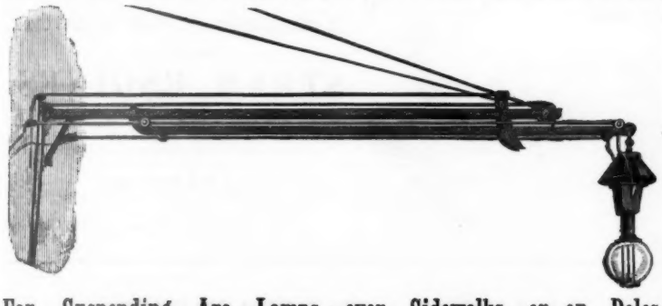

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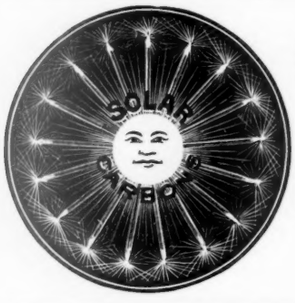

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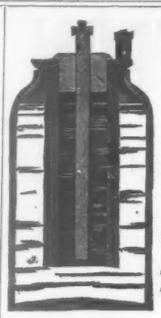

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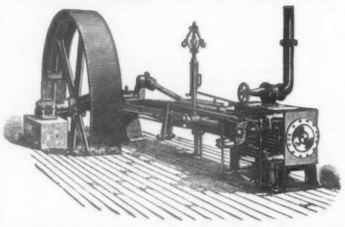

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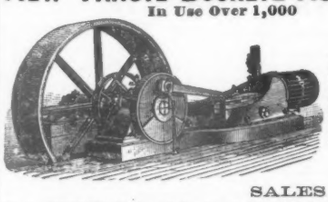

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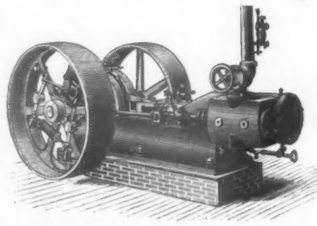

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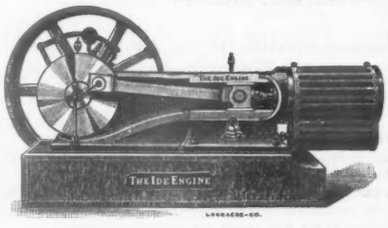

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All forms of incandescent lamps as well as a great majority of the "Detail" and "System" devices offered by others than this company and its licensees, infringe the above mentioned patents, and all persons using them render themselves individually responsible for such unlawful use, and all the consequences thereof, and liable to suit therefor.

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The Edison Electric Light Company having instituted suits on its patents, must decline to substitute the advertising columns of the press for the courts for the purpose of their legal interpretation. Mr. Edison's carbon filament patent of 1879 covers broadly the modern incandescent lamp. The claim that this patent has ever been in litigation in the United States Patent Office is absolutely false. In Germany and England, this fundamental patent has finally prevailed against all infringers, thus establishing the fact that Mr. Edison's great invention has been nowhere anticipated; *Ergo*, a like result must follow in the United States. The straining and distorting of these facts, together with the violent effort to interweave with them certain minor and IRRELEVANT CASES for the purpose of fraudulently posing before the public as joint heirs with Mr. Edison in the fruits of these patent decisions, only indicate the DIRE EXTREMITY of those who are thus gradually becoming ENVIRONED by due process of law.

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Keystone L. & P. Co., Phila., Pa.,	1500	"
" " " Allegheny, Pa.	1000	"
Citizens E. L. & P. Co., New Castle, Pa.,	1000	"
Westinghouse Ill.Co., Schenectady, N.Y.	1000	"
Oskaloosa E. L. Co., Oskaloosa, Ia.,	1000	"
East End E. L. Co., Pittsburgh, Pa.,	600	"
Beaver Dam E. L. Co., Beaver Dam, Wis.,	500	"
Butler E. L. Co., Butler, Pa.,	300	"

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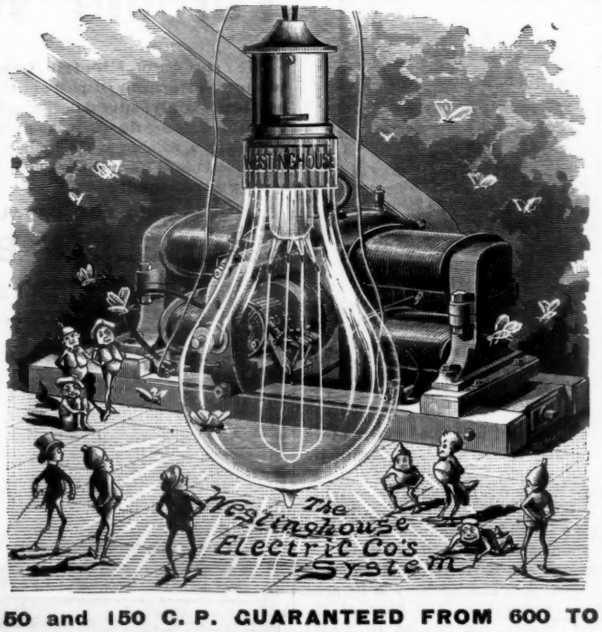
Monongahela House, Pittsburgh, Pa,	800	"
Windsor Hotel, New York,	600	"
Pennsylvania Lead Co., Pittsburgh, Pa.	600	"
T. C. Jenkins, Pittsburgh, Pa.,	400	"



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The Pittsburgh Club, Pittsburgh. Pa.,	350	16 c.p.
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The Smith Building, New York,	300	"
Globe Yarn Mills, Fall River, Mass.,	300	"
Morrison, Beare & Cass, Tyrone, Pa.,	250	"
The Philadelphia Co., Pittsburgh, Pa.,	250	"
Jas. Doak, Jr. & Co., Phila., Pa.,	200	"
Lombard, Ayres & Co., Bayonne, N. J.,	200	"
Fort William Henry Hotel, Lake George, N. Y.,	200	"
Norristown Opera House, Norristown, Pa.	200	"
Wheeling Steel Works, Wheeling, W.V.	125	"
Atlas Paper Pulp Co., Appleton, Wis.,	100	"
Kimberly and Clark Co., Appleton, Wis.,	75	"
Wilbur Eliason, Chestertown, Md.,	50	"
Burlington "Free Press," Burlington, Vt.	50	"
Fairbanks, Morse & Co., Chicago, Ill.,	50	"
E. T. Ames, Sparta, Wis.,	25	"
Gibson & Giles, Washington, Pa.,	25	"
Str. "Fishkill-on-Hudson," Newburgh, Pa.	25	"
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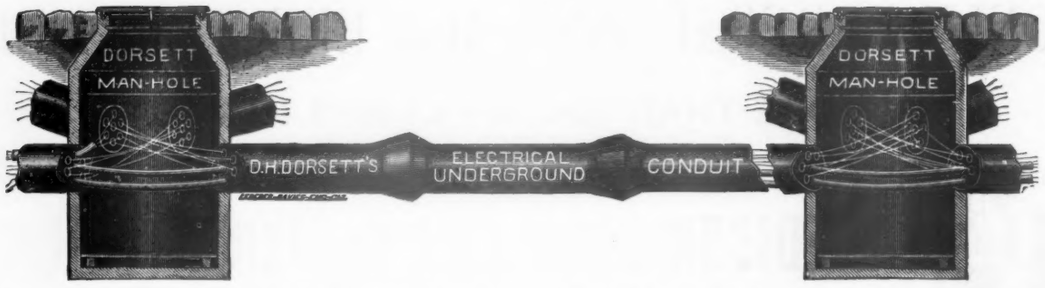

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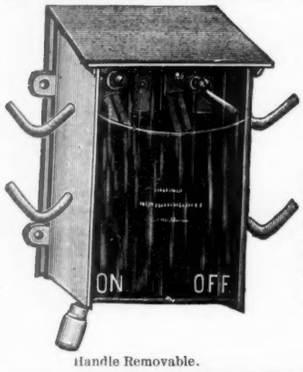

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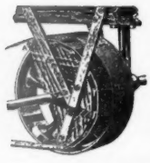

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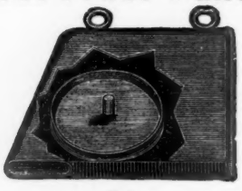

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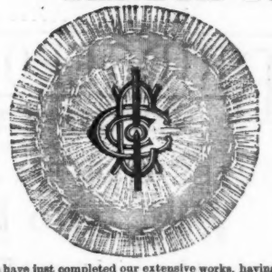

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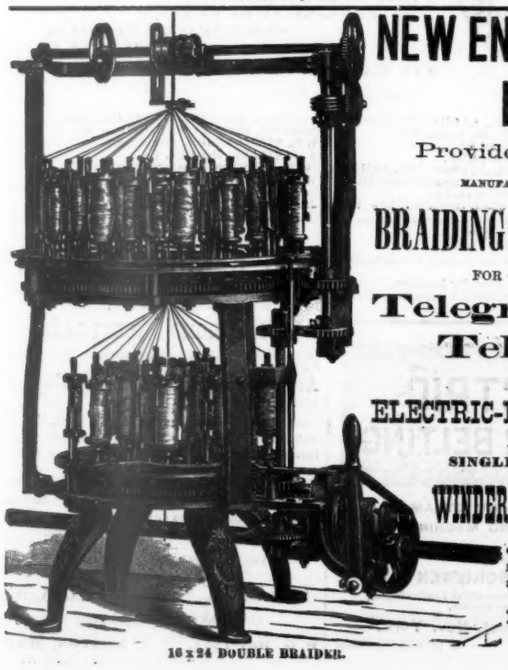

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